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Abdominal and General Surgery

The Value of the Scout Film in Diagnosis of Intestinal Obstruction

IRA H. LOCKWOOD, M.D., F.A.C.R., F.I.C.S., D.A.B.

KANSAS CITY, MISSOURI

THERE is no better introduction to this subject than the following quotation from Oliver Wendell Holmes, poet, philosopher and anatomist: "The best part of our knowledge is that which teaches us where knowledge leaves off and ignorance begins. Nothing more clearly separates a vulgar from a superior mind, than confusion in the first between the little that it truly knows, on the one hand, and what it half knows and what it thinks it knows on the other."

The truth expressed in this statement seems applicable to the title of this article. The study of the abdomen by scout film has proved so informative in the evaluation of lesions of the abdomen that it is considered an indispensable part of any abdominal diagnostic procedure. The term "scout film" has apparently been applied to the use of a single procedure; it is my impression that it should not be so applied. The technic is necessarily varied, depending on the location and type of lesion under consideration. The requirements for most abdominal conditions are: the anteroposterior, posteroanterior, lateral decubitus film and the erect posteroanterior and anteroposterior views. These projections are the most frequently utilized in this examination, although individual problems will require additional studies.

Many lesions in the abdomen are demonstrated by this type of roentgen examination. Some of the abnormalities are mechanical. The most common is intestinal obstruction. Obstructions of the small bowel are most commonly due to adhesions and external hernias and obstructions of the large bowel to primary carcinoma and volvulus. Wangensteen[1] has listed twenty-one causes of mechanical intestinal obstruction.

More than 80 per cent[2] of all intestinal obstructions involve the small bowel. More

From the Research Clinic, Kansas City.

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than 70 per cent of these are accounted for by obstructive bands and hernias, and more than one-third of all obstructions in the small bowel follow abdominal operations.

Other abdominal conditions detected by means of the scout film study are the paralytic and vascular occlusive diseases; perforation of a hollow viscus with the escape of air into the peritoneal cavity or the retroperitoneal space; calculus, and other diseases of the biliary, urinary and pancreatic tracts; and in children, intrinsic obstruction, which includes congenital obstruction due to atresia or stenosis, and extrinsic obstruction, which is related to embryonic aspects of intestinal rotation. Other conditions observed are soft tumor masses, abscess formation, pelvic disease and rupture of a solid organ, such as the spleen, liver or kidney.

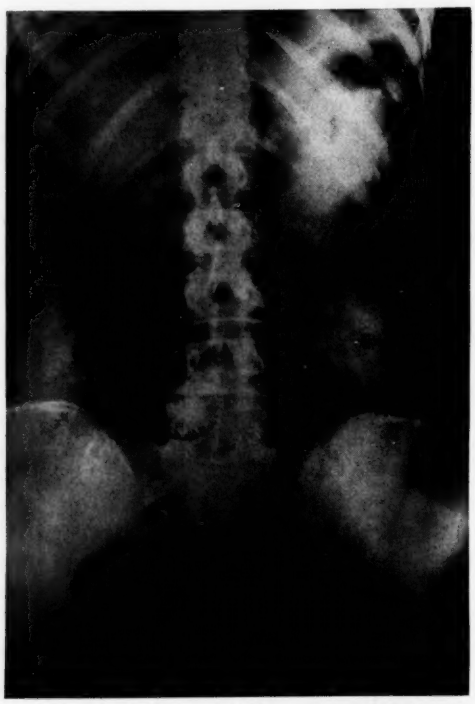

Fig. 1.—Single loop, with loss of vascular markings and obstruction due to adhesions.

Obstruction of the small bowel assumes an important role because of the diagnostic problem it presents and because of its very unfavorable prognosis and the necessity to consider this condition a surgical and radiologic emergency. Most cases of obstruction of the small bowel will present the cardinal symptoms of intestinal colic and vomiting. By intestinal colic I mean the concomitant occurrence of borborygmi at the acme of the pain. Abdominal distention may or may not be present. It is admittedly desirable to establish the diagnosis and institute treatment before distention occurs. Any patient who presents these symptoms must be considered to have intestinal obstruction, and it is imperative that a scout film study of the abdomen be obtained immediately (Fig. 1).

Not only can a roentgenogram of the abdomen indicate the site and degree of obstruction, but it often furnishes information concerning the type. The higher the obstruction, the more the vomiting, the less the distention, the greater the shock and the more severe the electrolytic imbalance. Many writers, including Wangensteen,[3] Pendergrass,[4] Sante,[5] Golden[6] and others have described the characteristic gas pattern in mechanical obstruction and adynamic ileus. Oppenheimer[7] and Wangensteen[3a] have ably discussed the roentgen characteristics of acute transient intestinal atony and spastic ileus. When the roentgenogram indicates gas in the small intestine, one must immediately decide whether the gas is present on the basis of adynamic ileus, inflammatory changes, congenital anomalies or actual mechanical obstruction.

The roentgenogram of mechanical obstruction (Fig. 2) is one in which a loop or loops of intestine are distended with gas. The degree of distention depends upon the site of the lesion and the duration and the degree of obstruction. Should

Fig. 2.—*A*, roentgenogram of abdomen at 4 a.m. *B*, roentgenogram at 7 a.m., showing increased distention.

the lesion be of recent origin, only an isolated segment or segments of bowel may show distention until it reaches a point at which multiple coils of small bowel assume a transverse position in the abdominal cavity. The portion of the bowel distal to the obstruction may remain relatively free from gas.

In my own opinion, with the earliest roentgen sign of acute obstruction of the small intestine, that is, the single loop of bowel distended with gas, and a clinical story of obstruction, the "green light"[8] is given for immediate operation. A single loop of obstruction is important from another aspect. It may mean that the blood supply to a segment of intestine is embarrassed if the normal anatomic markings are not clearly defined. The valvulae conniventes are present throughout the small intestine. They are more prominent in the upper portion, being most pronounced in the jejunum. When gangrene occurs (Fig. 3) the bowel quickly loses tone and becomes edematous and blackened. Its physiologic pattern rapidly disappears, and it becomes a smooth-walled tube distended with gas; this is a pathognomonic roentgenologic sign[9] of gangrene or embarrass-

Fig. 3.—Roentgenogram showing characteristics of impairment of blood supply.

ment of blood supply. There is another sign that may have definite value in the diagnosis of gangrene, which has to do with the geometric pattern of the intestine. Single or multiple C-shaped loops of small bowel arising from a common source of pedicle always indicate volvulus. This pattern is accompanied by a loss of the valvulae conniventes, the extent of which is proportionate to the degree of embarrassment of the blood supply. In no case should one correlate the degree of distention observed on the roentgenogram with the severity of the symptoms.

Rendrich and Harrington[10] have described the pathologic picture of the relatively uncommon superior mesenteric thrombosis (Fig. 4). The syndrome is extremely dramatic and fulminating, running its clinical course in but a few hours. The plain roentgenogram of the abdomen shows distention of the whole small bowel as well as the right half of the colon, and, although symptoms have been present only a few hours, the segments will show some loss of the normal anatomic markings of the ileum.

In the presence of regional ileitis, acute abdominal pain follows the ingestion of food when the bowel is stenotic and there is distention of the bowel above the stenotic area. The pain is crampy and is usually associated with diarrhea. When stenosis is severe there is a marked delay in the "transient time." One or more stenotic areas with relatively uninvolved zones[11] may be demonstrated by the scout film study, with the obstruction in both the stenotic and the nonstenotic phase of diffuse areas of blunting and thickening of the mucosal folds, with cobblestoning reticulation and rigidity.[12]

Regional ileitis was originally demarcated as a pathologic entity, since no single histologic feature as described was specific for the disease and since clinically in-

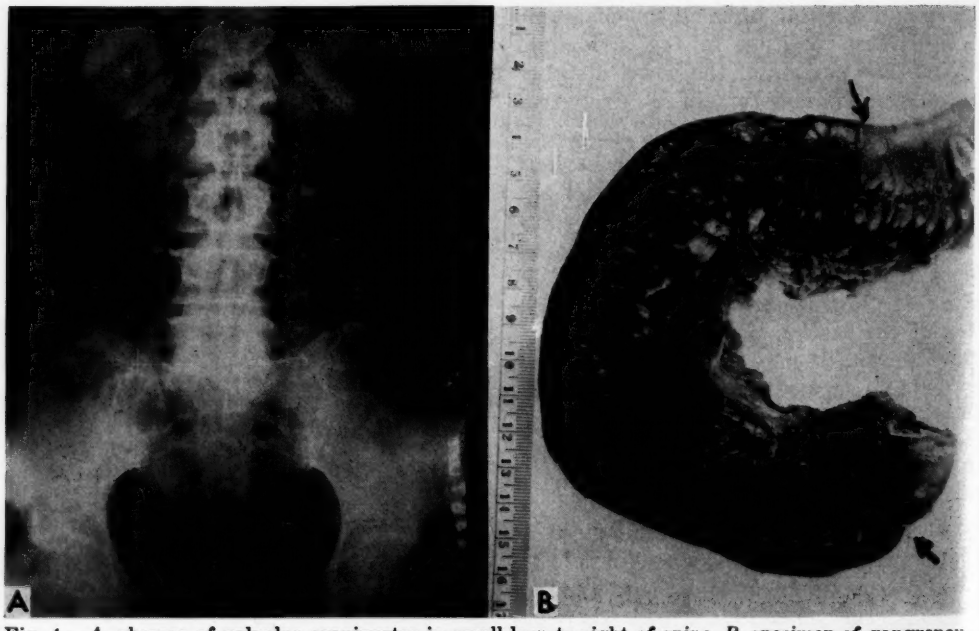

Fig. 4.—*A*, absence of valvulae conniventes in small loop to right of spine. *B*, specimen of gangrenous bowel.

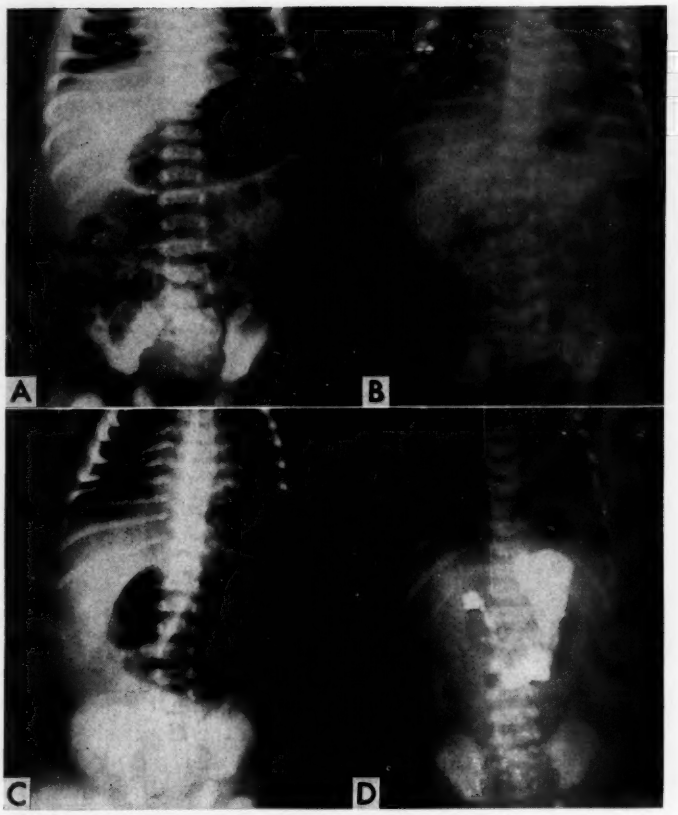

Fig. 5.—*A*, distended stomach of infant 3 days old with duodenal obstruction due to malrotation of intestine. *B*, roentgenogram taken ten days after surgical relief of obstruction. *C*, gas-filled stomach and duodenum proximal to duodenal atresia. *D*, complete retention of opaque medium in stomach and duodenal bulb three hours after barium meal.

flammatory disease of the colon and small intestine may coexist.[13] The cause of the disease remains unknown but the characteristic pathological process has been thoroughly established.

Intestinal obstruction in the newborn (Fig. 5) is nearly always due to congenital anomalies.[14] Until recently, interest in neonatal obstruction of the small intestine was limited to the pathologic study of these anomalies. The extreme normal variations[15] in both distribution and quantity of the gas occurring within the intestinal tract of infants and children reveal that gas reaches the proximal portion of the small bowel during the first hour of life, and by the third hour the entire small bowel contains gas. This time sequence is often delayed until the first feeding, especially if the infant cries little during the interim. Typical, plain films of the abdomen of a newborn child show the gas pattern of the small bowel as multiple, ill defined areas of radiolucency, confined for the most part to the left side of the abdomen. The bowel is not distended, and continuity of loops is undetectable. Occasionally, however, an excessive amount of gas may be observed

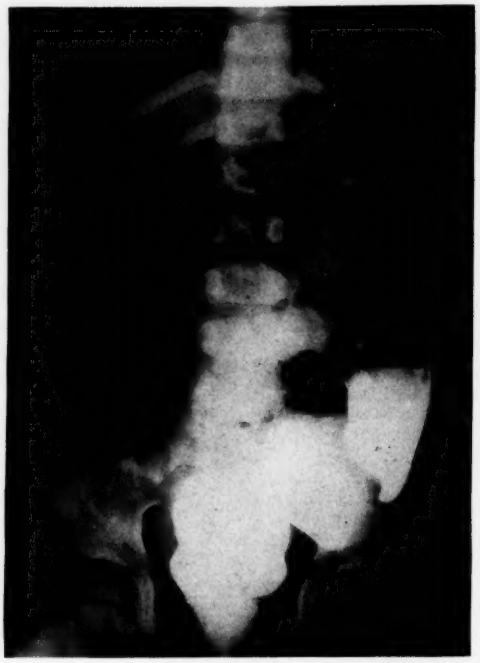

Fig. 6.—Delineation of coils of small intestine within colon, characteristic of intussusception.

in the small intestine of an infant who has swallowed a great deal of air. The intestinal loops may even be distended. In such cases gas is also present within the stomach and colon, presenting an appearance that may simulate mechanical obstruction or paralytic ileus. Fluid levels within both colon and small bowel are not infrequently seen in the absence of obstruction when films are taken with the patient in an upright position.

Careful and accurate analysis of the scout film study of the abdomen has proved a valuable method of early diagnosis. It shows a distended bowel above the block and a collapsed intestine below. Distention of both the stomach and the duodenum in an infant is usually due to congenital bands, stenosis or atresia. The last-mentioned condition is more common than stenosis and occurs more often in the ileum and duodenum; in more than half of the cases it is observed in the duodenum. There is another condition, adrenal cortical insufficiency,[16] which may manifest itself by severe vomiting and dehydration simulating high intestinal obstruction. Cases have been described in which the roentgenologic image of the lesion revealed a striking resemblance to high organic intestinal obstruction and the postmortem examination failed to show any obstructive gastrointestinal lesions, the adrenal glands demonstrating a marked diminution in cortical tissue, generalized cortical hyperplasia and a degenerative process.

There are two features[17] in the roentgenogram of the abdomen of the infant that suggest early obstruction of the small intestine. The first consists of a sharp turn of the intestine dilated with air. The other is increasing accumulation of air seen on the serial roentgenograms. Numerous conditions other than intestinal stasis, however, produce air-filled loops in the abdominal roentgenogram. For this reason the diagnosis of intestinal obstruction in the infant must always be supported by positive clinical signs.

Any acute mechanical intestinal obstruction is an absolute surgical and radiological emergency.[18] Pain, abdominal distention and vomiting always indicate a scout film study of the abdomen. This department considers roentgenographic study of the abdomen an absolute emergency, day or night. When the outcome of such an examination indicates obstruction of the small bowel, the patient is operated upon immediately unless so much distention is present or the physiologic picture is altered to such an extent that surgical intervention is not deemed wise. In the latter event, decompression must be carried out. A presumptive diagnosis of embarrassment of blood supply always means immediate operation.

Meconium ileus must always be sus-

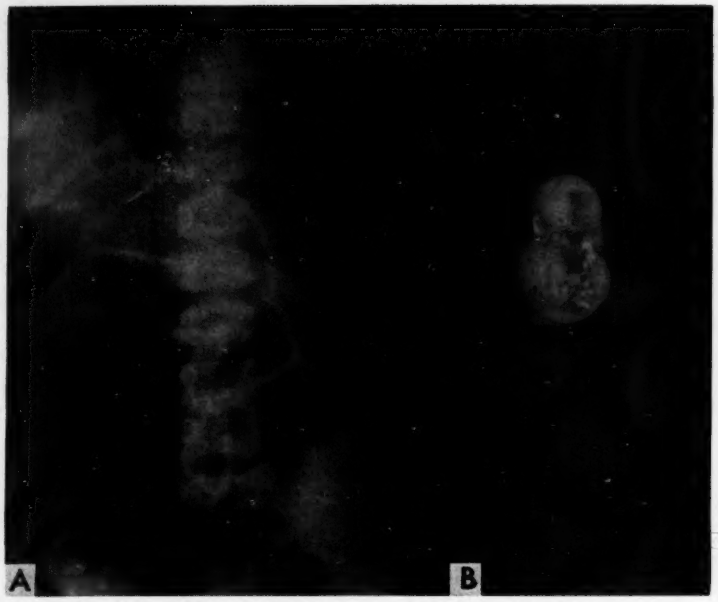

Fig. 7.—Roentgenogram demonstrating that soft tissue tumor masses, such as fibroma, often cause intussusception.

pected in a newborn infant with clinical and roentgen signs of obstruction of the small bowel and a negative history for the passage of meconium. The colon may be contracted, in contrast to the dilated small intestine, which is filled with a tenacious material. Meconium peritonitis is due to extrusion of meconium through a rupture of the bowel. It occurs during the last month of fetal life and in the newborn. Roentgen examination is made with a demonstration of free air and irregularly distributed calcifications in the peritoneal cavity. Fibrocystic disease of the pancreas is a frequently associated observation, and examination of the chest may also show pulmonary enphysema.

Acute intussusception[19] may produce complete obstruction of either the small or the large bowel, in which event the signs are those of mechanical obstruction. When the small bowel is intussuscepted (Fig. 6) into the cecum and ascending colon, preliminary films may reveal exclusion of gas from the right side of the colon and excess gas in the small bowel proximal to the portion that is intussuscepted. Occasionally there is enough gas in the cecum and ascending colon to outline the intussuscepted ileum.

Introduction of barium sulphate suspension into the colon by enema outlines the characteristic ringlike shadows of the intussuscepted portion of the bowel and a concavity in the column of the advancing barium mixture, produced by the invaginated portion.

Intussusception is occasionally due to a tumor (Fig. 7), a diverticulum or a gallstone that pulls the bowel with it as it moves forward by peristaltic action. Sometimes sufficient gas is present in the intussuscepted bowel for visualization of a tumor or other space-occupying lesion that produces intussusception, which is often demonstrable on a scout film study.

Paraduodenal (Fig. 8) or retroperitoneal hernia[20] is an uncommon cause of

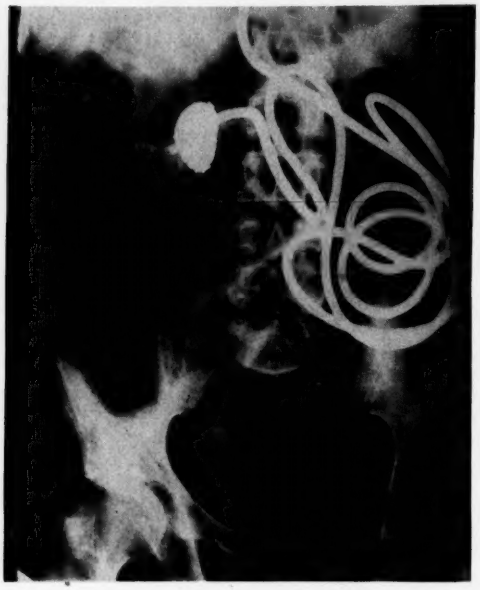

Fig. 8.—Unusual circular course of Miller-Abbott tube, due to paraduodenal hernia.

intestinal obstruction. The roentgen signs are the absence of loops of small bowel in the pelvis with the patient in an erect position, with a collection of distended loops of small bowel that appear to be confined within a hernial sac. Retroperitoneal hernias of the small intestine occur through an opening in the mesentery through the fossa about the cecum and through the lesser peritoneal sac; these are not frequent but must be considered when the scout film study shows excess gas in loops of the small bowel, especially when the coils are closely bunched in an abnormal position.

Decompression as a phase of treatment can be a powerful adjunct to definitive surgical intervention or can be the doom of the patient. It is logical to assume that the patient who presents either the clinical or the roentgen picture of distention needs decompression. To avoid the phase of distention, early operation is imperative. I am convinced that immediate operation is indicated for all types of loop obstruction, whether it is due to embarrassment of blood supply or to simple extraneous involvement. If the picture is one of distention, and particularly if the patient is in a state of chemical imbalance, decompression is indicated; however, one must be absolutely sure that the vitality of the intestine is not endangered. It is well to emphasize that no patient should ever be intubated if the blood supply of the intestine is in jeopardy, and that no type of intestinal intubation or decompression need be used if an early diagnosis is established and a definitive surgical operation carried out. In my opinion, no attempt should be made to intubate a distended large bowel with no gas in the small intestine; nor do I approve of passing a Miller-Abbott tube in an attempt to prevent ileus.

In the use of the scout film study of the abdomen, ileus[21] is the disease process most frequently observed. The roentgen picture is one in which the gas lies in multiple pockets, giving the impression that the gas "stops where it may." It may progress to a point at which the gas becomes so abundant that the coils of the intestine assume a transverse position in the abdominal cavity; however, the colon contains varying amounts of gas throughout its entire length, as does the stomach. The determination of the presence, type and cause is therefore one of the important functions of the roentgen examination of the acutely diseased abdomen. At times this may be difficult or even impossible without the careful correlation of the clinical observations, especially when excess gas and fluid are widely and uniformly distributed in the small and large bowel without definite evidence of a block. Such an appearance is due to paralytic or adynamic ileus, most commonly occurring in the postoperative patient.

Paralytic ileus not infrequently follows

cerebral vascular operations, coronary occlusion, acute biliary and urinary colic and shock from severe trauma.

Another manifestation of ileus,[22] described by Wangensteen as spastic ileus, is sometimes seen in cases of mesentery vascular occlusion, with distention of the small bowel and the colon as far as the splenic flexure. Negative results from a barium enema study will rule out a mechanical obstruction at the splenic flexure and support the diagnosis of vascular obstructive or spastic ileus.

Regional or segmental ileus[23] is observed in the presence of localized acute inflammatory disease, such as regional ileus, cholecystitis, pancreatitis or appendicitis. The site of the ileus suggests the area of primary disease. A carefully taken clinical history and physical examination will help to localize the acute inflammatory process. This fact, however, does not lessen the importance of the roentgen demonstration of segmental ileus, since it is often the most conclusive evidence of acute abdominal disease and frequently makes possible its localization, particularly in the case of an acutely enlarged inflamed gallbladder or appendiceal inflammatory process, or in the presence of pelvic lesions.

There are definite indications of intubation in cases of ileus in which there is disruption of the flow of the bowel contents by means of a nervous or muscular nervous mechanism. Bearing in mind that the picture of ileus is one in which the gas lies in multiple pockets and may become so abundant that the coils of intestine assume a transverse position in the abdominal cavity, the colon nevertheless usually contains varying amounts of gas throughout its length. Close cooperation is necessary between the internist, the surgeon and the radiologist, and there should be an accurate history to correlate with the roentgenogram. If the observations indicate an embarrassment of the blood supply, immediate operation is the only method of choice, and should the diagnosis of obstruction of the large bowel be in doubt a careful barium enema is indicated to rule out such a possibility.

In the scout film study of the abdomen one must remember that only 20 per cent of the obstructive lesions occur in the large bowel. When a diagnosis of obstruction is made, and when the scout film study reveals excess gas and fluid in both the small and the large bowel, with an abrupt ending of the gas shadow in the colon, despite such clear cut evidence a barium enema is indicated for better localization of the obstructive lesion.

Volvulus of the colon should be suspected when a scout film study shows tremendous distention (to the point of effacement of the haustral markings) with a high index of elongation of the bowel and mobility of the mesentery. In the presence of volvulus of the cecum and ascending colon[24] a scout film study reveals extreme distention of the right half of the colon by gas and fluid, with one or two fluid levels in the involved area. Marked distention of the right half of the colon is the outstanding roentgen sign; the diagnosis is difficult because of the migration of the cecum to an unusual location, often in the upper left quadrant. Although the consensus is that a preoperative diagnosis of volvulus of the cecum and ascending colon is seldom made, the possibility of an accurate diagnosis by radiographic means has been mentioned.[25] Failure of fixation is recognized as the principal cause of mobility of the right half of the colon; this anomaly might be seen in association with nonrotation, partial rotation and reverse rotation of the midgut or with an undescended or hyperdescended cecum.

Volvulus of the transverse colon constitutes one of the rarest forms of mechanical obstruction of the large bowel[26] and

reliable radiologic documentation of such an accident occurring in a normally developed colon is unusual.

Volvulus of the sigmoid is an important cause of colonic obstruction. Early diagnosis and immediate institution of proper therapy are essential. Prompt relief of the obstruction is necessary to prevent strangulation and necrosis of the bowel.[27] The characteristic signs are linear curved densities alternating with bands of increased radiolucency. The cause is a congenital increase in the length of the sigmoid and its mesentery, chronic recurrent constipation and inflammation with adhesions at the base of a long sigmoid loop.[28]

Scout film study of the large bowel, except in cases of volvulus or intussusception, should yield very little except in combination with other methods of study. Colonic obstruction produces symptoms that lead to digital, proctoscopic and radiologic examination in most cases before obstruction takes place.

SUMMARY

An attempt is made to point out the more obvious conditions that are discovered by the scout film study of the abdomen in the diagnosis of intestinal obstruction.

ZUSAMMENFASSUNG

Es liegt ein Versuch vor, die auffälligen Veränderungen, die sich an der Röntgenleeraufnahme des Bauches bei der Diagnose des Darmverschlusses entdecken lassen, hervorzuheben.

SUMARIO

Uma tentativa é feita no sentido de apontar as condições mais óbvias que se apresentam no estudo de filme (scout film) do abdomen no diagnóstico da obstrução intestinal.

RESUMEN

Se intenta señalar los hallazgos mas obvios que se obtienen en la placa simple de abdomen en el diagnóstico de la oclusión intestinal.

RÉSUMÉ

L'auteur essaye de mettre au point les conditions les plus manifestes, qui sont découvertes par un film préliminaire de l'abdomen pour la diagnose de l'occlusion intestinale.

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I believe in the United States of America as a government of the people, by the people, for the people; whose just powers are derived from the consent of the governed; a democracy in a republic; a sovereign nation of many sovereign states; a perfect union, one and inseparable; established upon those principles of freedom, equality, justice and humanity for which American patriots sacrificed their lives and fortunes. I therefore believe it is my duty to my country to love it, to support its constitution, to obey its laws, to respect its flag, and to defend it against all enemies.

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I feel that you are justified in looking into the future with true assurance, because you have a mode of living in which we find the joy of life and the joy of work harmoniously combined. Added to this is the spirit of ambition which pervades your very being, and seems to make the day's work like a happy child at play.

—Einstein

Abdominal Exposure for Suspected Appendicitis

K. WILSON JAMES, M.R.C.P. (Edin.), F.R.C.S. (Edin.), F.I.C.S.*

KINGSTON, JAMAICA

APART from its usual anatomic sites, the appendix may be found in a variety of abnormal places in the abdomen, varying from the interior of a hernial sac to inclusion in an intussusception. Its position in the abdominal cavity, moreover, is subject to variation due to adhesions to other organs, etc., as well as to such things as developmental abnormalities of rotation and descent. It follows that appendectomy has been performed through a variety of incisions, some deliberate and planned, and some fortuitous and occasioned by force of circumstances.

The appendix is occasionally removed, for example, during operations for diseases of the gallbladder or the stomach, through the incisions designed for these more extensive procedures. And, although its removal under these circumstances may be difficult and may have to be abandoned, in favor of a separate incision for the appendectomy, certain exposures, such as the upper abdominal transverse and the upper paramedian, which can be prolonged downward, lend themselves particularly to an easy appendectomy.

This article, however, is intended to deal specifically with cases in which deliberate incisions are made for appendectomy, and not with cases in which the operation is done secondarily after some larger procedure. The discussion will thus cover these cases in which a diagnosis of acute, subacute or chronic recurrent appendicitis has been absolutely or tentatively made and operation decided upon as a result.

Usually the surgeon, in deciding on the incision to be made in a given case, is guided by certain fundamental principles, the importance of which has been well established and the chief of which are as follows:

1. Anatomic considerations. These would include consideration of possible vagaries in position of the viscera, the disposition of nerves and muscles, and the supply. The aim in view is to insure the minimum of operative damage, the achievement of firm healing with good cosmetic results and, ultimately, the obviation of incisional hernia and persistent pain in the operative area.

2. Consideration of the acuteness of the condition and the possible presence or absence of pus.

3. Consideration of the available means of obtaining satisfactory access to the suspected lesion.

4. Consideration of the exploratory possibilities in view of the differential diagnosis.

5. Consideration of ways and means of facilitating extension of the field of operation in the face of difficulties and complications that may attend the procedure.

Surgeons have long recognized the fact that an abdominal operation should always be undertaken, when possible, in the spirit of a laparotomy, and the operating surgeon would do well to remember that the mere satisfactory removal of an appendix in a case of right-sided pain is not an end in itself. The ideal operation should restore the patient to perfect health, and this is better attained by one operation and proper exploration than by a series of procedures based on trial and error.

*Hon. Consulting Surgeon, Kingston Public Hospital, Kingston.

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In considering an appendectomy, the surgeon has his choice of a variety of incisions, and these, like the tools of a master workman, are each fitted for advantageous use in some particular endeavor. He should therefore choose his incision with the same meticulous care as the latter chooses his instruments. Only in this way will the ideals of surgery in this particular field be realized.

Suspected acute appendicitis has the nature of an emergency. The patient is frequently unprepared for the hazard, toxic and perhaps dehydrated. Even with adequate preoperative preparation the simplest and most direct surgical approach is safest here, with avoidance of wide undercutting of tissue planes and extensive opening of muscle sheaths. The incision should also insure easy and quick postoperative closure of the wound and should carry a minimum risk of later incisional hernia.

On the other hand, subacute and recurrent abdominal pain in the right iliac fossa calls for a more timely operation and a more thorough exploration of the abdominal cavity.

Apart from the formidable list of possible causes of right-sided pain in the lower part of the abdomen, multiple pathologic conditions associated with appendicitis itself are frequent, especially in the female. In as many as 20 per cent of women operated on in a personal series, some pelvic adnexal pathologic condition was present in addition to the diseased appendix. This is especially liable to be the case if the position of the appendix is pelvic, a situation that makes an incision like McBurney's particularly undesirable, except for small children. The pelvic adnexal disease that often coexists with appendicitis is apt to be overlooked if a small exploratory incision is used, and the same applies to any other pathologic condition that may be present.

Several incisions are available in cases of suspected appendicitis:

McBurney's Incision: This enjoys wide popularity and is used in the vast majority of appendectomies performed. It gives easy access to the appendix in most cases and offers a satisfactory approach to the majority of abscesses. It also enjoys the reputation of being most rarely followed by postoperative hernia. It is the incision of choice for children and for adults in whose cases the diagnosis is certain or abscess is suspected. It is also preferable when operation is being done with the region under local anesthesia.

In patients over 60 years of age, too, in whom appendicitis is less common (only 2 per cent of surgical cases, according to Simpson), McBurney's incision offers the advantage of enabling one to do a prompt cecostomy should the condition turn out to be obstruction of the large bowel.

This incision is, however, associated with certain distinct pitfalls and disadvantages, and these deserve emphasis, as they are often apparently forgotten:

First, there is the danger of inclusion of the ilioinguinal nerve in a ligature. The ilioinguinal nerve occasionally passes superficially but often pierces the fibers of the internal oblique muscle. At times it lies beneath that muscle. In any case, the nerve is in danger of inclusion in any ligature blindly placed through the fibers of the internal oblique muscle, and its inclusion undoubtedly accounts for a number of cases of postoperative pain after operations with McBurney's incision. In this connection it must be stressed that the practice of suturing blindly, as many do, the fibers of the internal oblique muscle is not without danger of including this nerve, and the figure-of-eight suture used by some surgeons is particularly dangerous. These ligatures, moreover, tend to produce ischemic necrosis of the muscle fibers, especially if drawn tightly, and

should be used with great reserve and considerable caution. Many surgeons insert no suture at all into the internal oblique muscle. There is much to be said in favor of this.

It is also claimed by some that the internal ring is weakened if the ilioinguinal nerve is injured, as this nerve supplies the conjoined tendon, weakness of which facilitates onset of a hernia in the inguinal region.

Another great disadvantage of McBurney's incision lies in its restriction of thorough exploration, especially when one is dealing with subacute and chronic disease in a female patient. It is true that the incision can be extended by incising either along the outer side of the rectus sheath or transversely across it, with retraction of the fibers. Even this, however, does not permit really thorough exploration, and in my opinion this incision should rarely if ever be used except in cases of the acute condition, as access to both sides of the pelvis is impossible and exploration of the abdomen is limited indeed.

The Pararectal (Battle's) Incision: This incision, if modified by retraction outward of the rectus muscle to avoid damage to the eleventh and twelfth thoracic nerves, has much to recommend it, and is without some of the disadvantages of McBurney's. It may not be as nearly ideal as is McBurney's in dealing with certain acute conditions or in tackling some abscesses, but it is certainly superior to the latter in the surgical treatment of subacute, recurrent or chronic right-sided pain in adults, particularly women. It also gives quite a satisfactory exposure in cases of emergency, and the upper part of the abdomen is easily explored by its extension.

The Transrectal Incision: This resembles Battle's incision but involves separation of the rectus fibers with possible injury to the nerve supply. Although injury to a single nerve is not of grave consequence, the incision has little to recommend it.

The Paramedian Incision: This incision shares some of the advantages of the pararectal and offers even greater facilities for exploration. There is access to the appendix and to both sides of the pelvis, and the incision can be prolonged upward to make it possible to explore the upper part of the abdomen. The incision, however, has the slight disadvantage of requiring a little greater retraction to obtain adequate exposure of the pelvis.

The Midline Incision: This is not used by surgeons nowadays, since it results in a weakened scar and in special liability to hernia. It is common, however, for surgeons to make the midline incision through the skin only and to open the rectus sheath on one side, proceeding as with the paramedian incision.

The Modified Transverse Suprapubic Incision: This has certain advantages. It follows in the skin crease, running transversely, with a slight curve downward, a fingerbreadth above the symphysis pubis, with its midpoint at the midline. A skin flap is raised as in the goiter collar incision in the neck and, after ligature of the superficial epigastric vessels, the wound becomes absolutely avascular and a flap is easily elevated almost to the umbilicus. A vertical incision is then made on either side of the midline through the right rectus sheath, exactly as in the paramedian incision, and the operation continues as with the latter.

The incision differs from the Pfannenstiel in being lower—exactly in the region of the pubic hair—and in the fact that the rectus sheath is incised longitudinally in the direction of its fibers and the latter retracted outward. A firm invisible scar covered by suprapubic hair results, and the cosmetic aspect of the incision is perfect.

The transverse suprapubic incision i

ideal for pelvic operations. It also gives satisfactory exposure in dealing with subacute and chronic recurrent appendicitis, especially in women.

The Lanz Incision: This is a modification of McBurney's incision and gives excellent exposure and a good cosmetic result. It begins at the level of the anterior superior iliac spine and runs transversely in the skin crease. The deeper dissection is similar to McBurney's. This incision is specially favored in dealing with an abscess of the appendix.

The Rutherford Morrison Iliac Incision: This also gives good exposure. It runs obliquely downward and inward in the flank, just internal to the anterior superior iliac spine. The external oblique muscle is split parallel with its fibers, and the internal oblique and the transversalis muscles are cut in the direction of the incision. The incision lies between the eleventh and twelfth thoracic nerves, so that these escape injury. If necessary, the sheath of the rectus is opened and the muscle retracted medially, after which the posterior sheath is divided. At the end of the operation the abdominal wound is closed in layers.

This article is not by any means intended to be exhaustive, but only to stress certain points in the choice of an incision in operating for suspected appendicitis. It is to be emphasized that no single established incision can be recommended as the one of choice. Each case should be judged on its own merits, and the slavish adopting of any established incision, especially McBurney's, is most undesirable.

The operation for suspected appendicitis may prove simple, but it may also prove tedious and difficult. Similarly, the pathologic condition present may be simple, but it may also be multiple and complex. The abdominal exposure has much to do with the success of the operation and the ultimate well-being of the patient, and the surgeon who aims at conferring lasting benefit on his patient will do well to bear these facts in mind when deciding on his incision.

SUMMARY

In cases of suspected acute appendicitis, McBurney's, Lanz's and Rutherford Morrison's incisions usually offer direct access to the appendix and are to be preferred, especially in dealing with a possible abscess. The paramedian and the modified Battle's incision also offer good exposure, and may be preferable when diagnosis is somewhat doubtful.

In cases of chronic recurrent and subacute appendicitis, especially in women, the transverse suprapubic, the modified Battle and the paramedian are the incisions of choice. In such cases McBurney's incision should rarely be used (except in children), as it does not permit satisfactory exploration.

The transverse suprapubic incision leaves an invisible scar and shares in most of the advantages of the others. It has much to recommend it and gives excellent results.

ZUSAMMENFASSUNG

In den meisten Fällen von Verdacht auf akute Blinddarmentzündung, besonders wenn es sich um die Möglichkeit eines Abszesses handelt, verdienen die von McBurney, Lanza und Rutherford Morrison angegebenen Einschnitte den Vorzug und bieten einen unmittelbaren Zugang zum Blinddarm. Der Paramedianschnitt und der modifizierte Battlesche Einschnitt ermöglichen ebenfalls eine gute Exposition und sind vielleicht vorzuziehen, wenn die Diagnose zweifelhaft ist.

Bei chronischen rückfälligen und subakuten Blinddarmentzündungen (besonders bei Frauen) sind die transversalen suprapubischen, der modifizierte Battlesche und

die paramedianen Einschnitte die Methoden der Wahl; hier sollte ausser bei Kindern der McBurneysche Schnitt nur in Ausnahmefällen angewandt werden, weil er keine befriedigende Explorierung gestattet.

Der transversale suprapubische Schnitt hinterlässt keine sichtbare Narbe und bietet alle Vorzüge der anderen Einschnitte und ist daher sehr zu empfehlen, um so mehr als er auch zu ausgezeichneten Ergebnissen führt.

RIASSUNTO

Nei casi di sospetta appendicite acuta di solito si usano le incisioni di McBurney, di Lanz e di Rutherford Morrison che offrono un accesso diretto all'appendice e specialmente in caso di ascesso. Anche l'incisione paramediana e l'incisione di Battle modificata danno una buona luce e sono indicate quando la diagnosi è dubbia.

Per l'appendicite cronica e ricorrente, sopratutto nelle donne, l'incisione di scelta è la sovrapubica trasversale, o la Battle modificata o la paramediana; il taglio di McBurney deve essere impiegato di rado tranne che nei bambini, perchè non consente una esplorazione completa.

L'incisione sovrapubica trasversale lascia una cicatrice invisibile e possiede la maggior parte dei vantaggi delle altre incisioni e pertanto deve essere raccomandata particolarmente.

RÉSUMÉ

En cas de soupçon d'une appendicite aigue les incisions de Mc. Burney, Lanz et Rutherford Morrison offrent généralement l'accès directe à l'appendice et ils sont préférables, spécialement si la possibilité d'un abscès existe. Aussi l'incision paramédiane et la modification de Battle offrent un bon accès et ils sont préférables, si la diagnose et un peu douteuse.

Pour les récidives de l'appendicite chronique et subaigue (spécialement chez les femmes) les incisions suprapubique transverse, Battle modifié et paramediane sont les incisions indiquées, l'incision de Mc. Burney sera choisie rarément, excepté chez les enfants, puisque l'exploration n'est pas satisfaisante.

L'incision suprapubique, transverse, qui laisse une cicatrice invisible et offre touts les avantages des autres incisions, est bien recommandée et donne des résultats excellents.

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The spirit of conversation consists far less in the exhibition of one's own talents than in enabling others to show theirs. He who leaves you pleased with himself and with what he has said is also perfectly pleased with you.

—*La Bruyére*

The Use of Catgut Sutures in Tantalum Gauze Hernia Repair

A. J. SPIRE, M.D., AND L. J. SPIRE, M.D., A.I.C.S.

SYRACUSE, NEW YORK

MANY volumes have been written about hernias and their repair, but the subject will be interesting as long as the condition exists, repairs are performed and recurrences take place. It is not our intention to introduce anything new, but rather to broaden the field of surgical repair of hernial defects.

Our attention was first focused on tantalum gauze as an adjunct to anatomic structures in hernia repair in 1948. On May 4, 1948, two large incisional defects were closed with No. 0 chromic catgut, reinforced by tantalum gauze which was anchored with No. 0 chromic catgut. The first case has been followed up to the present time. From May 1948 through June 1954, 62 hernias of different types have been repaired by this method. Fifty of the repairs have been checked prior to this writing, and 2 patients died shortly after the operation.

Of the 62 repairs there has been 1 known recurrence in a woman who had

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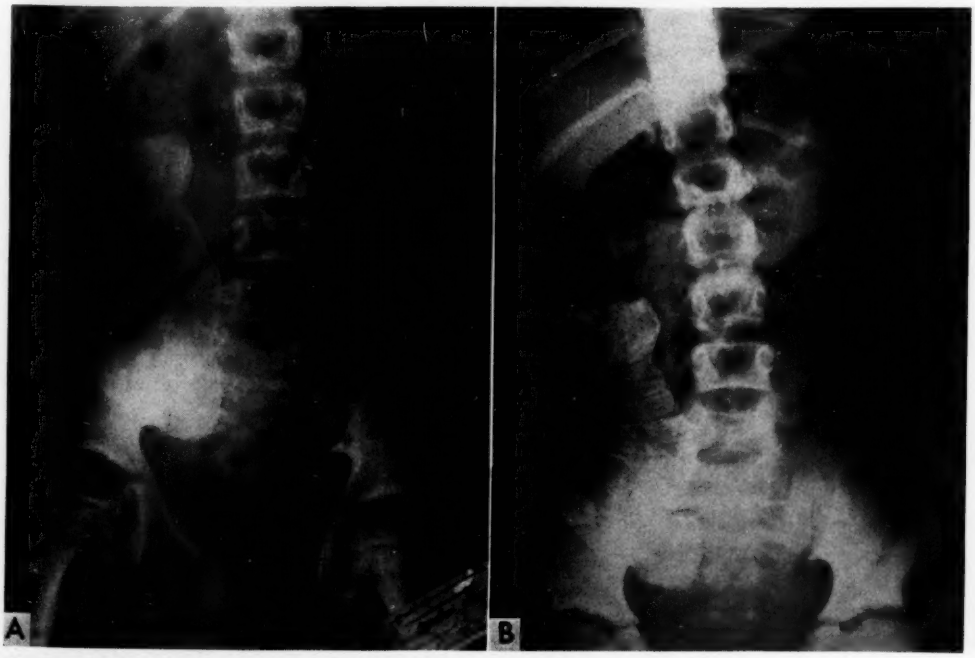

Fig. 1.—*A*, condition of gauze nine days after the operation. *B*, dense fibrous tissue and metallic repair eighteen months later.

undergone two previous repairs of a lower midline incision. She was a factory worker who did heavy lifting. Two years after the tantalum gauze repair the gauze actually split in the middle while she was lifting a heavy object. Another repair was performed, which, up to the time of this report, is doing nicely.

There were 2 deaths in the series, 1 from an incisional hernia and the second following repair of a meningocele.

One case of persistent draining sinus has been encountered. This, in our opinion, was caused by our own poor surgical judgment in attempting to use the gauze to repair an umbilical hernia in a young undernourished child. The mesh was removed in an office procedure and the wound healed spontaneously and well.

Vaginal plastic procedures can be discouraging; however, we had an excellent result in 1 case of a large cystocele, which developed many years after a vaginal hysterectomy. The gauze is still palpable under the vaginal mucosa, but the repair is excellent and the patient has no discomfort.

It has been advocated on at least one occasion that gelfoam be placed over the gauze at the time of repair. We had tried this procedure and found it unsatisfactory; subsequent trials were equally discouraging, so the practice was dropped. It was our experience that serum drainage from the wound was excessive for weeks

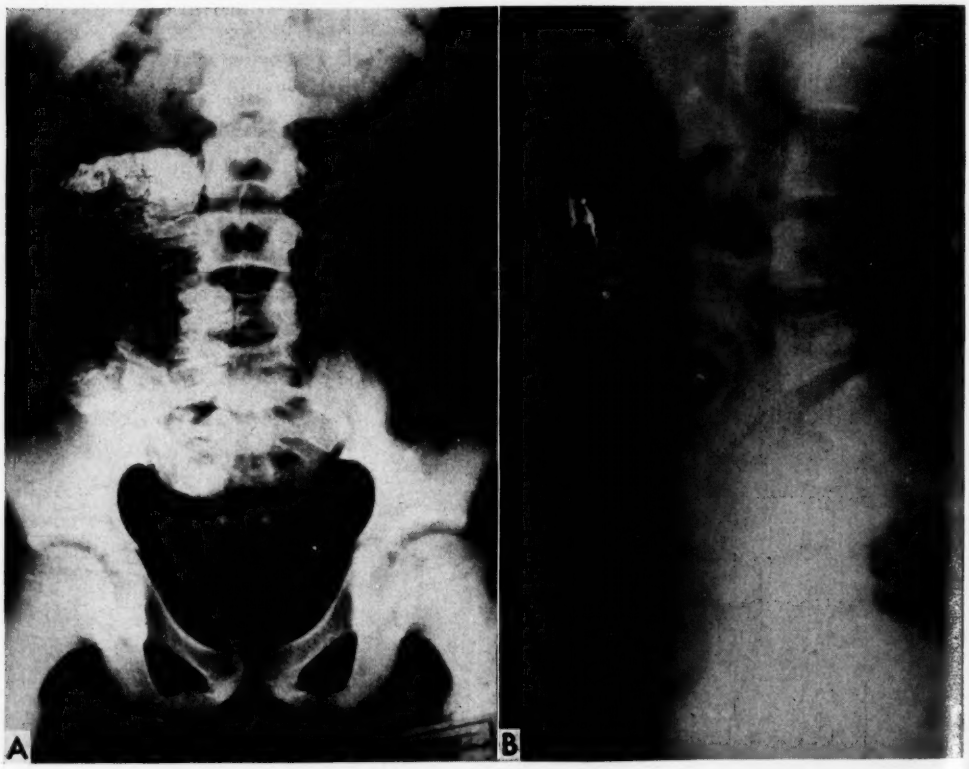

Fig. 2.—*A*, gauze becoming fragmented but still in place at thirty-six months. *B*, lateral view showing general thickness of repair.

after the operation. We do not condemn the use of hemostatic agents, but if catgut sutures are to be used for the repair it is unwise to add them.

During the last few years we have discussed the subject of tantalum gauze hernia repairs with a number of different colleagues. Many of them have never used it because they were unfamiliar with nonabsorbable suture technics. It is hoped that this paper may give some assistance to these men, and we have adopted some definite standard technics in our own work.

1. The use of No. 0 chromic catgut around the edges of the gauze, tied with two knots with enough tension to keep the gauze taut, has been satisfactory in our hands.

2. A center line of sutures is added when possible.

3. We no longer fold the edges of the gauze.

4. Hemostatic agents are not placed over the gauze.

5. Whenever possible the gauze is placed under muscle or fascia.

6. Small rubber tissue drains are used for dependent drainage in obese patients.

Follow-Up of Fifty-Two Cases

Type of Hernia	*No. of Cases*	*Deaths*	*Recurrence*
Incisional	27	1	1
Inguinal (primary and recurrent)	22		
Cystocele	1		
Umbilical	1		
Meningocele	1	1	
	52	2	1

Nine patients did not report for follow-up, so our information is not complete; however, the number of successful repairs would seem to justify the method used, especially since one only adds the gauze in those cases in which one fears recurrence.

Since June 1954 another group of hernias has been repaired with stainless steel mesh gauze. Thus far, in 10 to 15 repairs, our results have been uniformly good. One death, however, followed an extensive bowel resection and repair of a large incisional hernia. The death was probably caused by an acute coronary attack.

ZUSAMMENFASSUNG

Die Verfasser geben einen Überblick über die Ergebnisse von 52 Bruchoperationen. Da neun Kranke nicht zur Nachuntersuchung erschienen, is der Bericht nicht vollständig. Die Verfasser glauben aber, dass die Zahl der erfolgreichen Operationen ihre Methode rechtfertigt, besonders da die Verwendung der Gaze nur in solchen Fällen herangezogen wird, wo Gründe bestehen, einen Rückfall zu befürchten.

Seit Juni 1955 ist eine andere Gruppe von Kranken mit Brüchen unter Verwendung von Gaze aus nicht rostendem Stahlgewebe operiert worden. Die Erfolge waren bis jetzt in zehn oder fünfzehn Operationen gleichmässig gut. Ein Todesfall war nach umfangreicher Darmresektion und Reparatur einer grossen Einschnittshernie zu verzeichnen. Der Tod war wahrscheinlich durch einen akuten Kranzschlagaderanfall bedingt.

RIASSUNTO

L'autore riassume i risultati della cura di 53 ernie. Dei pazienti 8 non si presentarono al controllo, sichhè l'indagine non è completa; tuttavia, in base al numero dei successi ottenuti, egli ritiene che il metodo sia buono specialmente per il fatto che le garze metalliche vengono impiegate soltanto quando vi sia il timore della recidiva.

Dal giugno del 1954 un altro gruppo di ernie è stato curato con impianto di garze di acciaio inossidabile; i risultati sono stati buoni. Si è avuto un caso di morte in seguito ad un'ampia resezione di intestino e plastica di un grande laparocele postoperatorio. La morte è stata probabil-

mente causata da un attacco coronarico acuto.

RÉSUMÉ

L'auteur resume les résultats de 52 opérations reparatrices d'hernies Neuf patients ne retournèrent oas pour réexamination, de sorte que l'information des auteurs n'est pas complète. Tout de même à leur opinion le numéro de bons succèss opératifs justifie la méthode, spécialement dans les cas, ou on a peur d'un récidive.

Depuis le mois de Juin 1954 un autre groupe de hernies fut réparé avec de la gaze d'un filet de fil de fer non oxydable. Jusqu'à présent les résultats chez 10 ou 15 opérés etaient également bons. Il y avait un incident mortel après une résection intestinale extensive d'une large hernie ventrale. Probablement la cause de la mort était une attaque coronaire aigue.

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The whole community may be considered as though it were a single laboring unit, with ten thousand different tasks distributed among its members, all linked together into the one common task which we call civilization. Looking at labor in that synoptic manner, one may say, in homely language, that society has only one job to offer to its members. The name of it is civilization, or, if you prefer, progress. We may be farmers or statesmen, carpenters or surgeons, stokers or artists, teachers, lawyers, shopkeepers, clergymen—what you will; but these vocations are only the different names we have for our different contributions to the one task we all share in common, that of carrying forward the work of civilization, which is the work of the ages, and which some call the Kingdom of God.

—*Jacks*

Practical Problems in Surgical Treatment of Mitral Stenosis

W. R. RUMEL, M.D., F.A.C.S., A.C.C.P., P. R. CUTLER, M.D.
AND
J. D. MORTENSEN, M.D.
SALT LAKE CITY, UTAH

DURING the past few years tremendous strides have been made in the surgical treatment of rheumatic mitral stenosis. Much has been learned about the selection of suitable cases, the surgical physiologic and pathologic factors, the management of technical problems and the results obtained. This experience has demonstrated beyond doubt that the state of health of many victims of this serious disease has been improved greatly and that many others have been spared from certain death. This experience has also shown that a significant number of persons have failed to obtain the result hoped for because of a number of somewhat complex reasons. The reported operative mortality rates, as well as the rates of improvement, have varied considerably in the literature. Indeed, some figures,[1] when observed casually, would cast doubt on the advisability of recommending the operation, because of high operative mortality rates and low rates of improvement. Such reports recently have resulted in increasing confusion and skepticism with regard to the true value of mitral commissurotomy. Physicians and surgeons should therefore attempt to clarify the problem by a critical analysis in order that they may fulfil their moral obligation to patients suffering from this disease. Certainly it would be dereliction of duty if one failed to recommend a relatively safe procedure which would improve a given patient's health or actually save his life. On the other hand, if those benefits could not be obtained without undue risk, the surgeon would be doing wrong by recommending the operation.

This presentation is the result of our efforts to clarify the situation on the basis of a review of the literature and a study of the results obtained in our personal series of 150 patients. Emphasis has been placed on analyzing the causes of poor results and of postoperative fatalities, particularly those cases which are potentially controllable, either partially or completely, by adequate management on the part of the medical and surgical team. Even casual observation shows that many factors are involved in guiding a patient successfully through this surgical procedure. These can be separated into subdivisions: selection of cases, preoperative preparation, technical management and postoperative care. Since consideration of all of these factors would be impossible in this short presentation, we concluded that a study of the patients who died and those

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whose condition became worse would be most apt to provide information that would be helpful in improving the end results of the operation.

Analysis of Cases.—Since the first operation, which was done on May 17, 1951, 152 operations have been performed on 150 patients (2 reoperated on for recurrent stenosis). Nine patients were excluded from further study because, for various reasons, they did not actually undergo mitral commissurotomy.

In 1 case the operation was performed mainly for the purpose of stopping recurrent embolization from atrial thrombi, but also with the hope that significant stenosis might be associated with the obvious mitral insufficiency. However, significant stenosis was not present.

Commissurotomy was not performed in the second case because the left atrium was so extensively thrombosed that it was not possible to enter the chamber through the appendage or the atrial wall. An attempt to enter through the pulmonary vein caused serious hemorrhage from an inaccessible laceration, which made further efforts inadvisable.

In the remaining 7 cases mitral insufficiency was readily recognized, but its relative degree was miscalculated. In all of these there was gross mitral insufficiency without significant stenosis; therefore, commissurotomy was not done.

The causes of death in the 143 operations are given in Table 1. Since causes 1, 3 and 4 are of greater practical importance because they are potentially preventable, they alone will be discussed.

Traumatic (Surgical) Mitral Insufficiency. — In this phase of the study the results attained with various technics, correlated with pathologic changes present, were evaluated for each individual commissure (Table 2). Thus, 192 commissures were attacked during 143 operations on 141 patients. In 112 commissurotomies mitral insufficiency was not produced or increased by the operation. In 59 instances an insignificant increase occurred, being estimated at 4 cc. per beat or less. None of the patients in this group failed to improve. In 21 commissurotomies a greater degree of insufficiency was produced, being estimated at 5 cc. or more per beat. This group was subdivided into

TABLE 1.—*Causes of Death from Mitral Commissurotomy (19 Deaths Following 143 Operations)*

	Cause of Death	*Postoperative*	*Late*	*Total*
1.	Traumatic (surgical) mitral insufficiency	2	2	4
2.	Complications referable to the central nervous system	2	2	4
3.	Acute hypotension with myocardial ischemia and failure	4	0	4
4.	Recurrence of mitral stenosis	0	1	1
5.	Miscellaneous			
	Quinidine toxicity	1	0	1
	Obstruction of the small bowel	0	1	1
	"Heart attack"—no autopsy	0	1	1
	Mitral insufficiency—failure	0	1	1
	Electric shock therapy	0	1	1
	Psychosis with complications	0	1	1
	Totals	9 (6.3%)	10 (7.0%)	19 (13.3%)

TABLE 2.—*Technical Details in 192 Commissurotomies (143 Operations)*

Method	Without Production of Mitral Insufficiency		With Production or Increase of Mitral Insufficiency						Totals
			Insignificant Change 4 cc. or Less		Significant Change Patients Same or Improved		More Than 4 cc. Patients Worse or Dead		
	Good Valves	Bad Valves	Good Valves	Bad Valves	Good Valves	Bad Valves	Good Valves	Bad Valves	
Finger fracture	AL 41 PM 16 57	AL 16 PM 4 20	AL 25 PM 11 36	AL 1 PM 1 2	AL 2 PM 0 2	AL 1 PM 0 1	AL 1 PM 0 1	AL 0 PM 0 0	AL 87 PM 32 119
Hook guillotine	AL 9 PM 2 11	AL 3 PM 1 4	AL 5 PM 0 5	AL 1 PM 0 1	AL 3 PM 1 4	AL 0 PM 0 0	AL 4 PM 2 6	AL 1 PM 2 3	AL 26 PM 8 34
Downward cutting knife	AL 9 PM 3 12	AL 1 PM 3 4	AL 7 PM 8 15	AL 0 PM 0 0	AL 1 PM 0 1	AL 1 PM 2 3	AL 0 PM 0 0	AL 0 PM 0 0	AL 19 PM 16 35
Other instruments	AL 2 PM 1 3	AL 1 PM 0 1	AL 0 PM 0 0	AL 0 PM 0 0	AL 0 PM 0 0	AL 0 PM 0 0	AL 0 PM 0 0	AL 0 PM 0 0	AL 3 PM 1 4
Totals	AL 61 PM 22 83	AL 21 PM 8 29	AL 37 PM 19 56	AL 2 PM 1 3	AL 6 PM 1 7	AL 2 PM 2 4	AL 5 PM 2 7	AL 1 PM 2 3	AL 135 PM 57 192

AL = Anterolateral Commissure
PM = Posteromedial Commissure
For definition of good and bad valves, see text.

11 with lesser degrees of insufficiency, the patient's response varying from no change to a very significant improvement (none became worse) and 10 with greater degrees of insufficiency, all of whom are worse or dead.

Evaluation of the methods of commissurotomy gave specific support to impressions we have had for some time with regard to the relative safety of digital and instrumental commissurotomy, particularly the danger *in our hands* of using a hook guillotine type of valvulotome (Table 3).

In 19.2 per cent of the anterolateral and 50 per cent of the posteromedial commissures opened with a hook guillotine type of knife, the degree of insufficiency produced was such that the patients fell into the category of "worse or dead." With digital commissurotomy a similar serious degree of mitral insufficiency was produced in 1.1 per cent of the anterolateral commissurotomies and none of the posteromedial. With the downward-cutting knife the production of such a degree of insufficiency did not occur at all. The data support the statement[2] that serious leakage is more apt to follow surgical attack on the posteromedial commissure than on the anterolateral. In spite of this, it was interesting to note that in 2 of the 3 patients who died of surgically produced mitral insufficiency the anterolateral commissure only was opened with a hook guillotine knife.

The difference in the results obtained with the hook guillotine and the downward-cutting knife were not to be explained on the basis of the commissure attacked, since in 34 commissurotomies performed with the hook guillotine the anterolateral commissure was divided 26 times and the posteromedial 8 times. In 35 commissu-

rotomies performed with the downward-cutting knife the anterolateral commissure was cut on 19 occasions and the posteromedial on 16 (Table 3).

In order to determine the relation between the production of mitral insufficiency and the type of pathologic change that was present, the valves were arbitrarily divided into "good" valves and "bad" valves. Good valves were those with minimal calcification, or none, and good flexibility of the leaflets, although the fibrous thickening of the stenotic ring frequently was extremely tough, requiring instrumental division. Bad valves were those which showed gross calcification, frequently with large irregular masses, and a moderate to marked degree of thickening of the leaflets generally that decreased their mobility to a significant degree. The incidence of production of serious mitral insufficiency in the group of bad valves was significantly greater than it was in the group of good valves (Table 2), as has been reported by others.[3] Nevertheless, in the vast majority (32 out of 39) classed as bad valves, it was possible to open the commissures without producing or increasing preexisting insufficiency to a significant degree.

Essentials of Safe Commissurotomy.—As surgical incision of the commissures of the mitral valve is strictly a technical mechanical problem that one should be able to master with proper instruments and experience, surgeons should be able to improve their results by a better understanding of the mechanics involved when correlated with the anatomic and pathologic changes. In performing mitral commissurotomy without producing mitral insufficiency, two points are absolutely essential: (1) the chordae tendineae must not be injured, and (2) the leaflets must not be damaged (Fig. 1*A*).

1. *Avoidance of Injury to the Chordae Tendineae:* The mitral valve might be considered as a bivalvular structure whose leaflets, in the closed position, lie roughly in a plane perpendicular to the attached chordae tendineae. The chordae are roughly parallel to one another as they approximate in the closed position. Therefore, if a cutting instrument is inserted deep to the plane of the valve it will not injure the chordae *if* it is parallel to them, which also means that its axis is essentially at right angles to the plane of the valve (Fig. 1*B*). Any angulation away from this safe axis will increase the likelihood of chordal injury, with resultant leakage in direct proportion to the increase of the angle (Fig. 1*C*). Any instrument used in cutting the commissure from the atrial surface downward is intrinsically less apt to injure the chordae than are instruments which cut sidewise or from below upward. This is true because even if the axis of the instrument should be angulated away from the safe axis, an injury to the chordae is relatively unlikely, since the downward pressure forces the leaflets downward, making the chordae lax and buckled and therefore much less vulnerable to damage (Fig. 1*D*). The passage of any type of hook-shaped instrument through the mitral valve is particularly likely to catch the chordae, owing to slight degrees of rotation and/or angulation of the hook that cannot be avoided in a moving heart (Fig. 2*D*). The more nu-

TABLE 3.—*Traumatic (Surgical) Mitral Insufficiency; Patients Worse or Dead; 188 Commissurotomies*

Technic and Number	*Anterolateral* %	*Posteromedial* %
Finger fracture 119	1.1	0
Downward-cutting knife 35	0	0
Hook guillotine 34	19.2	50

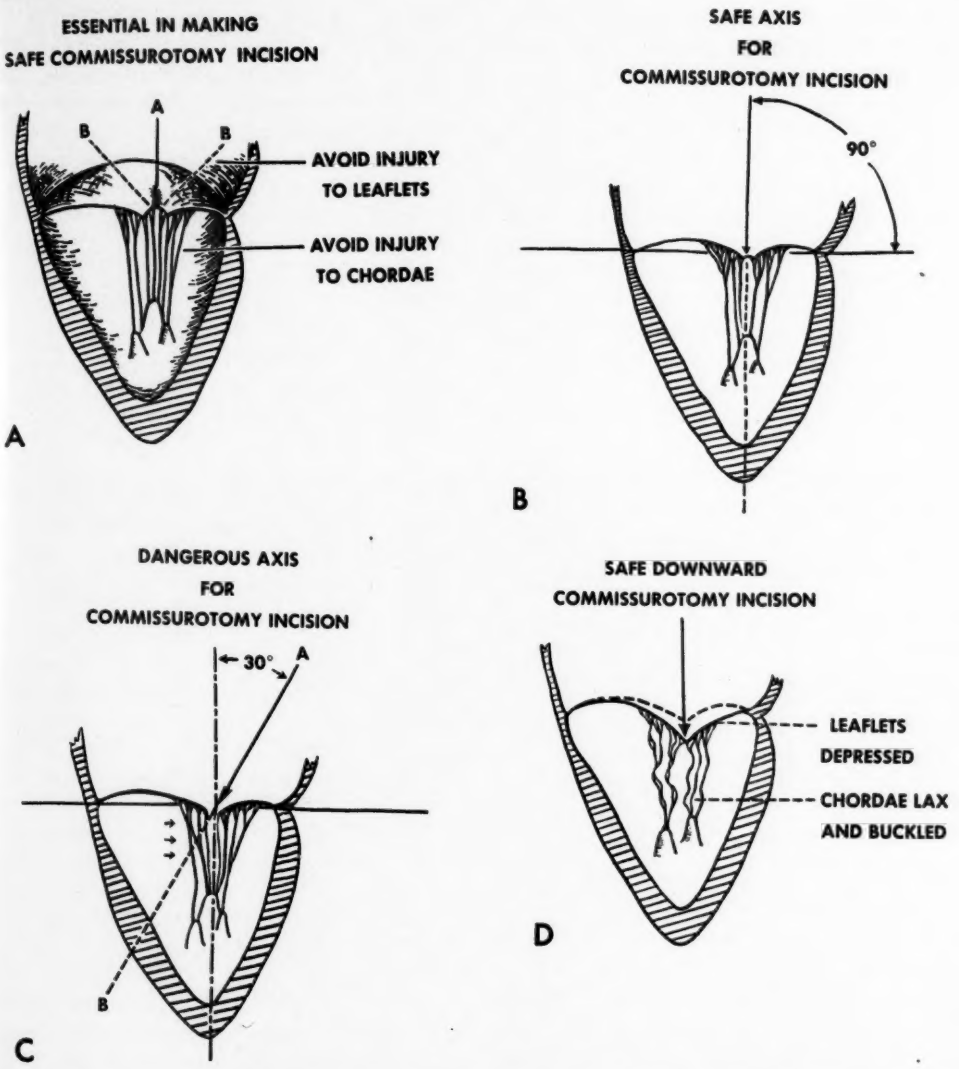

Fig. 1.—*A*, sketch demonstrating that safe commissurotomy must separate leaflets precisely in the commissure (*A*). Incision at some other point, such as *B* or *B'*, produces significant insufficiency. *B*, incision in the commissure perpendicular to the plane of the valve and parallel to the chordae. This is safe. *C*, incisions away from the safe axis which favor serious chordal division. See arrows. *D*, downward commissurotomy incision depresses the leaflets, relaxes the chordae and minimizes the tendency toward chordal injury.

merous the chordae—that is, the less the fusion due to disease—the greater the likelihood of catching and dividing one or more of these important guy wires. As chordal fusion increases, owing to advancement of the pathologic process,[5] the tendency to catch the chordae decreases. Still, if any of the larger aggregations of

fused chordae should be divided, the degree of insufficiency will be correspondingly greater.

Since it is difficult to visualize adequately some of these mechanical problems, a plastic model was created with an excised mitral valve sutured into place in such a manner as to illustrate more or less accurately the geometric problems as they exist in life with the patient in the standard posterolateral position (Fig. 2*A*). The photographs of the model depict the entrance through the auricular appendage as a relatively fixed point, as it is in the actual operation, owing to the small arc that can be traversed by displacement of the atrial wall as well as to the limitation imposed by the unyielding intercostal incision. As a result of the relative fixation of the atrial entrance, no instrument with a simple curve in one plane can be manipulated into the safe axis of commissural division as here defined. This is relatively applicable to the anterolateral commissure and still more applicable to the posteromedial (Fig. 2*B*). In order to attain a safe axis, the point of entrance into the atrium would have to be rotated downward some 60 degrees (Fig. 2*C*). The mechanism of catching the chordae in a hook type of

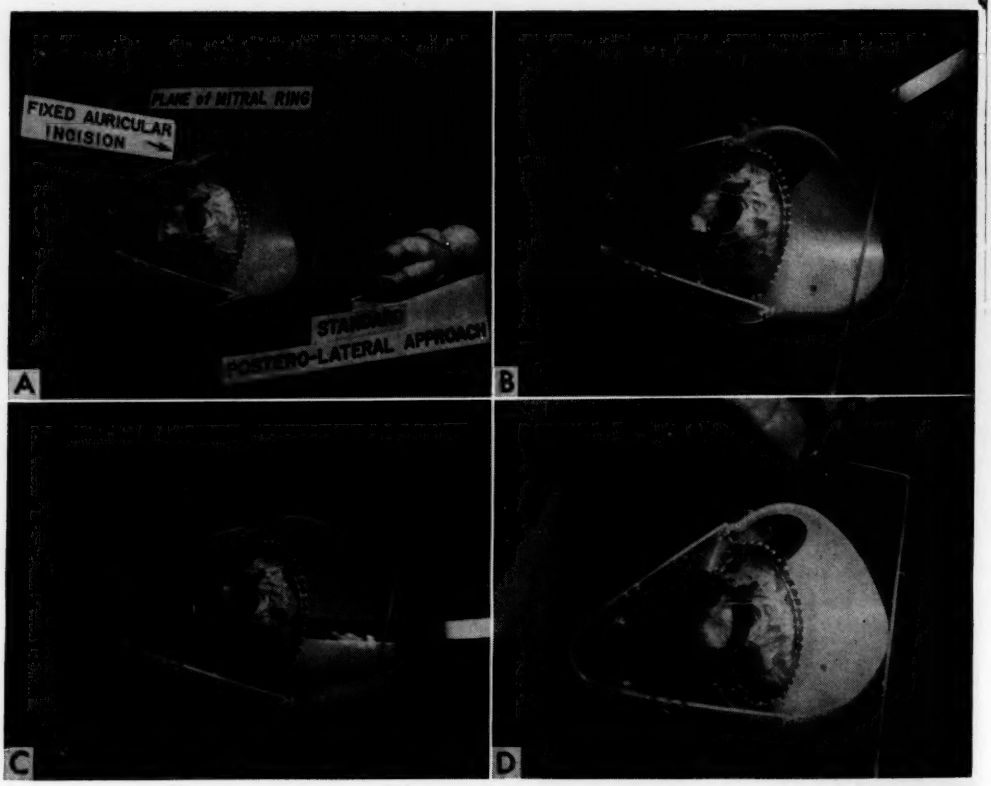

Fig. 2.—*A*, normal mitral valve sutured into plastic model in essentially correct geometric relations. The point of entrance through the auricular appendage is relatively fixed. *B*, the same, showing a dangerous cutting angle. The instrument used is a simple curved valvulotome. *C*, same instrument in safe cutting position (impossible through routine auricular incision). *D*, the same, showing the chordae caught by a valvulotome of the hook type.

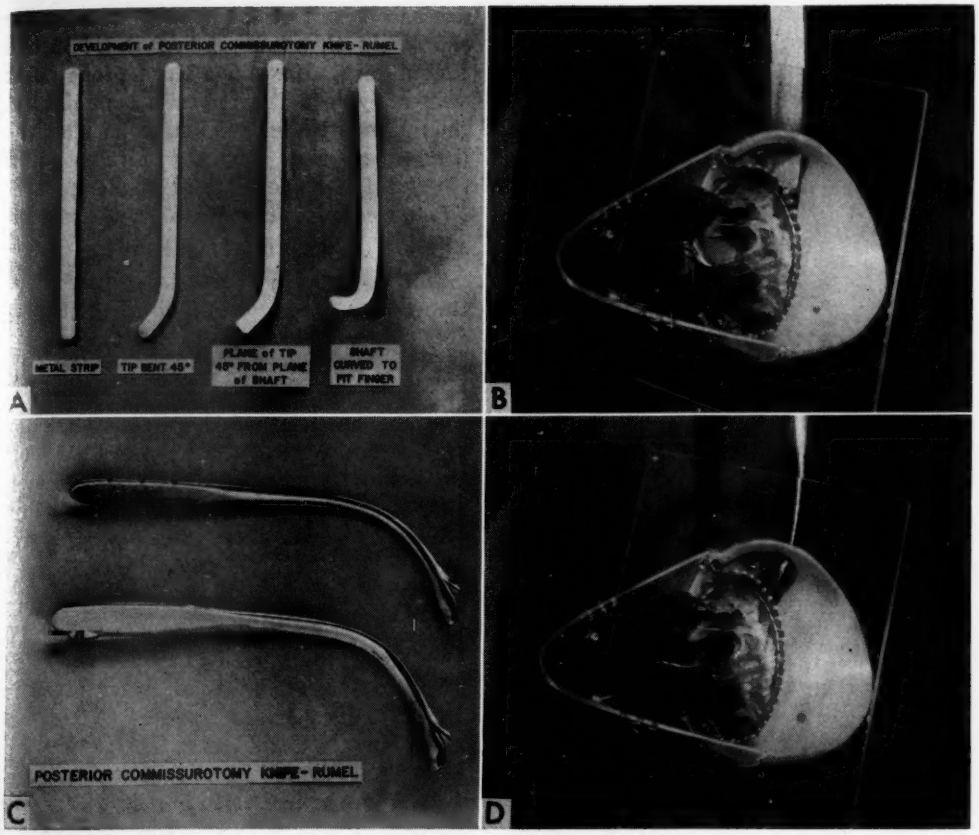

Fig. 3.—*A*, development of posterior commissurotomy knife. Beginning with a simple flat metal strip, the distal end is first bent 45 degrees or somewhat more. Next, the plane of the distal end is twisted clockwise some 45 degrees. Finally, the shaft is curved moderately to fit the curve of the finger within the atrium; thus the tip is aligned to the safe axis of commissurotomy. *B*, final strip through fixed atrial entrance, with tip in safe axis for commissurotomy. *C*, photograph demonstrating that these instruments embody the angulations described under *A* and also the expandable guide that forces the cutting blade accurately into the opposite commissure. *D*, knife in safe axis for commissurotomy.

guillotine because of rotation of the plane of the tip of the instrument is well shown (Fig. 2*D*).

2. *Avoidance of Injury to Valve Leaflets:* Any incision into the substance of the valvular leaflets, particularly the aortic, will cause leakage of the valve varying from an amount producing no significant clinical effect to an amount causing a fatal outcome in a very short time. It is imperative, therefore, that the commissural incision be made precisely in the line of fusion of the leaflets if insufficiency is to be avoided (Fig. 1*A*). The accurate placement of a cutting instrument in either end of an elliptic opening should be a simple problem. The probability of entanglement of the tip of the instrument in the subjacent chordae, however, makes the problem more complex. In actual practice, gross errors in the placement of the incision have occurred. The tendency toward such entanglement can be minimized by making the distal end of the instrument broad and

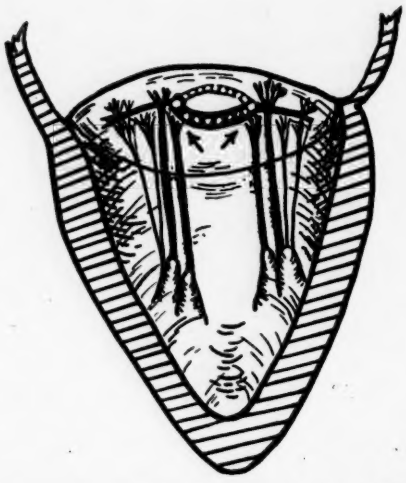

Fig. 4.—Ventricular surface of valve, showing firm fibrous ring of tight mitral stenosis limited at points of "critical attachment of chordae" (see arrows). The ideal commissurotomy *must* divide both ends of the ring and separate completely both commissures.

blunt rather than thin and sharp or hooked.

Individual surgeons have their preferences with regard to instruments and become adept at using the one or two of their choice. It would be foolish to state that a given surgeon could not attain sufficient skill by practice with a given instrument to carry out safe and satisfactory commissurotomy. It would be equally foolish to state that the aforementioned fundamental facts can be overlooked by the average surgeon without unnecessarily increasing the danger of the operation. With these thoughts in mind, we have developed downward-cutting knives which, in our opinion, more nearly satisfy the fundamental requirements that make for safe commissurotomy (Fig. 3).

The knife shown in *A*, Figure 3, will make an incision perpendicular to the plane of the valve and parallel to the chordae as a result of the double curve of the shank. In *B*, an expanding guide in one commissure adjusts the blunt probe point accurately into the opposite commissure, thus allowing the incision to be made at the proper point. With the knife shown in *C* the cut is made from above downward, which minimizes the danger of chordal injury.

Our experience with this instrument convinces us that we can obtain considerably better results in the future than we have in the past, particularly when the valves are good. With bad valves and a funnel-shaped orifice there is a tendency for the downward-cutting knife to slip off the commissure without making an incision. In such cases one of the side-cutting knives or a hook guillotine may be required.

Recurrent Mitral Stenosis.—Since our first operation was done (on May 17, 1951) there have been 3 cases of recurrent mitral stenosis and 1 additional case in which the course is suggestive but not clear cut. In all 3 cases the opening attained was definitely inadequate or a surgical compromise. In the first case the valve was bad, with extreme calcification and diffuse thickening throughout, making adequate mobilization impossible. In addition, only the anterolateral commissure was opened. Furthermore, unquestioned evidence of recurrent active rheumatic infection developed in the patient, who died rather suddenly a few days before his scheduled reoperation. The second patient had a good valve, but only the anterolateral commissure was opened—and that incompletely—so that the opening achieved was snug around the distal interphalanged point, or approximately 1.8 cm. long. Definite recurrence developed, making reoperation necessary twenty months later. The third patient also had a good valve, but the anterolateral commissure alone was only partially

opened, so that the orifice too was snug around the distal joint. Again stenosis recurred, requiring a second operation twenty months later.

In all of these cases the operations were inadequate or compromise commissurotomies according to our present standards. This experience coupled with reports of a few cases[6] that have appeared in the medical literature, remove the question as to whether or not mitral stenosis recurs. The more important question as to the frequency of recurrence, however, will not be fully answered for some years to come.

Pathologic Changes Related to Recurrent Stenosis: As a result of the rheumatic process, fusion of the mitral leaflets occurs from each extremity toward the center and, according to Brock,[7] most markedly in the regions of the "critical points of attachment" of the major chordae tendineae, bringing about a more or less uniform size of the narrowed orifice. Although further narrowing may occur, these points of critical attachment constitute a point of firm fibrous union which frequently is easy to reach during commissurotomy but difficult to break or cut completely through on either end. This fibrous ring produces obstruction as well as decreased mobility of the leaflets, even though they may be normally thin and flexible peripheral to the scarred annulus (Fig. 4).

Another important pathologic change is a progressive deposition of scar tissue, with or without calcification, onto both leaflets. This brings about progressive thickening and progressive decrease in valvular flexibility and mobility. The less the total mobility of the leaflets, the less satisfactory will be the relief of obstruction through commissurotomy and the greater will be the tendency to refusion of the leaflets along the line at which they were divided. This must be true for the same reason that excessive motion at

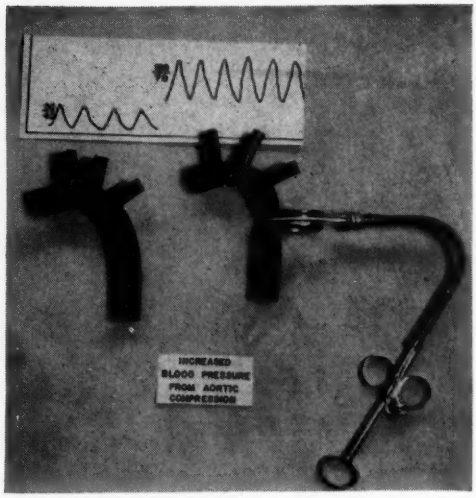

Fig. 5.—Reproduction of intra-arterial pressure curves, showing increased blood pressure resulting from aortic compression.

the site of a healing fracture or of an incised wound minimizes the healing tendency, while immobilization favors healing. As the flexibility and mobility of the leaflets decrease, the need for complete division of the fibrous ring and *complete* separation of the fused leaflets in both commissures increases.

If one hopes to attain the maximal degree of improvement in valvular function, one's goal must be complete division of the fibrous ring with accurate extension in *both* directions until the fused leaflets are separated to the point where the commissures normally terminate, which is close to the atrioventricular junction. Anything short of this ideal is a surgical compromise, even though such a compromise may be justified. In our series of 143 operations, compromises were accepted in the majority of cases, especially early in our experience, as is indicated by the fact that the anterolateral commissure alone was opened in 60.8 per cent, the posteromedial alone in 4.1 per cent and both commissures in 35.1 per cent. The figures of surgeons

with much greater experience are similar, according to reports from the Bailey Thoracic Clinic.[2] Here the anterolateral commissure alone was opened in 65 per cent, the posteromedial in 1.9 per cent and both in 33.2 per cent of cases. Actually, it is rather surprising and perhaps encouraging that stenosis has not recurred much more frequently than it has, in view of the frequency of such compromise operations.

The expectation that stenosis of many surgically treated valves will recur over a period of time equivalent to that normally required for the stenosis to develop initially, as indicated by Wood,[3] is impossible to evaluate, particularly if widespread prophylactic chemotherapy and antibiotic therapy are carried out postoperatively. There seems to be no basic reason, however, to doubt that the frequency of recurrence will be less among patients in whom the ideal of maximal valvular flexibility and mobility is attained by the operation. If a compromise or an inadequate result is obtained, whether due to advanced pathologic changes or to incomplete opening of one or both commissures, the rate of recurrence must be expected to be higher.

All who have had significant experience with mitral commissurotomy have been faced with situations that would justify a compromise short of the ideal surgical result. By all odds the most important deterring factor is the possibility of producing or increasing mitral insufficiency. If insufficiency has been produced in either commissure, further efforts in such an area cannot be pursued safely without serious risk to the patient. The potential danger of producing insufficiency, particularly in the posterior commissure, is well known, especially if instrumentation proves necessary. Frequently, therefore, if a reasonably good commissurotomy has been attained anteriorly one may accept a compromise opening, because of the fear of producing posterior leakage, even though it may be fully recognized that recurrent stenosis is much more apt to appear at a later date. The obligation of surgeons seems very clear. They must strive to improve their technical attainments, so that the surgical ideal will be the rule and the compromise the exception, and this must be done without significant risk to the patient. Each surgeon must determine which methods will enable him to attain this goal most consistently.

With regard to the technic of commissurotomy, our experience in opening 192 commissures has been rather similar to that of others. It was possible to use finger fracture in 119 instances, with production of serious or fatal insufficiency on one occasion — due to excessive force, which produced a tear into the aortic leaflet. In the remaining 73 instrumentation was necessary.

Acute Hypotension with Myocardial Ischemia and Failure. — In studying the causes of death during or shortly after mitral commissurotomy one often encounters such terms as "cardiac arrest," "cardiac failure," "postoperative hypotension," "protracted hypotension," "ventricular fibrillation," "myocardial insufficiency," "failure to awaken—died in shock," "uremia," "cerebral anoxia," "renal failure," etc. A review of 4 of our fatal cases—in 3 of which the patient died on the operating table and in 1 of which death occurred seventy-two hours later — has suggested the likelihood that acute hypotension with myocardial ischemia and failure may be a common precipitating cause of the deaths reported in this heterogeneous group. Certainly acute hypotension and myocardial ischemia may produce tissue anoxia and concomitant tissue electrolyte disturbances in the myocardium and other organs, notably the central nervous system. These changes further aggravate the hypotension, which in turn increases the anoxia attached to

of the myocardium and the central nervous system. If the vicious circle is not broken by removing the initiating cause, then cardiac arrest or ventricular fibrillation may follow. A fatal termination at this point could properly be ascribed to "cardiac arrest," "cardiac failure," "ventricular fibrillation," "myocardial insufficiency," etc. Even if resuscitative measures are successful, the damage to the cardiovascular and nervous systems is frequently of such degree that hypotension may persist for a number of hours, producing fatal "renal failure" or "uremia." In patients who have had pulmonary edema preoperatively the damage to the alveolar membrane resulting from additional acute hypoxia may well be sufficient to precipitate postoperative pulmonary edema even though the mitral obstruction has been relieved. In this event the cause of death may be listed as "pulmonary edema," but the basic initiating cause was the acute hypotension, with myocardial ischemia and failure.

From a practical standpoint, in our experience, two procedures are of the utmost importance in setting the vicious circle into motion. The first is digital or instrumental obstruction of the stenotic mitral orifice. Such obstruction, if complete, prevents the filling of the left ventricle and promptly causes hypotension in the coronary and cerebral arteries. The second factor is rapid loss of blood from the atrium, whether it is accidental or planned[8] in order to "flush out" clots from the atrium.

Tolerance of acute hypotension, with its resultant vicious circle of serious complications, varies greatly in individual patients and is most certainly decreased by many factors, the most important being advanced age, cardiomegaly, coronary sclerosis, renal impairment, generalized hypoxia resulting from sedation or anesthetic drugs, anemia, pulmonary edema and preexisting damage to the central nervous system.

In order to avoid the serious consequences that follow acute hypotension during a mitral operation, certain practices, in our opinion, are of definite help. It goes without saying that all general factors, such as correction of anemia, avoidance of anoxia, optimal management of renal problems, etc., should be carried out. In addition, during the operation, before one manipulates or obstructs the mitral valve, the following factors should be considered and managed properly: 1. Oxygenation of the blood should be brought to a maximal level by allowing full expansion and ventilation of the lungs by the anesthesiologists. 2. Before proceeding, if hypotension is present, a suitable vasopressor, such as neosynephrine or methoxamine hydrochloride, should be used to reestablish a normal or near-normal pressure. 3. Manipulations producing obstruction of the mitral orifice should be as brief and infrequent as possible. 4. If loss of blood is anticipated, blood for replacement should be immediately available and used as rapidly as the loss occurs. 5. Care should be exercised to avoid compression or angulation of the left coronary artery,[9] which may produce hypotension and ischemia. 6. According to our initial impression, brief aortic compression, which has been used in a few instances, may well be life-saving if applied immediately during rapid loss of blood to maintain the central aortic pressure head until the blood is replaced and compensatory mechanisms come into play. We have satisfied ourselves of the efficiency of aortic compression distal to the left subclavian artery in elevating a shock level pressure to an adequate pressure by routine cuff measurements as well as by direct intra-arterial recordings (Fig. 5). If, before the intracardiac manipulations are begun, a wide tape is placed around the aorta and

a flexible Rumel tourniquet with a specially adapted atraumatic flat compressing surface, the aorta can be compressed at any moment without retraction of the lung or interference with the operative procedure in any way. This procedure has proved useful in cardiac resuscitation, although occlusion of the aorta for more than a few minutes at a time must be carefully avoided.

CONCLUSIONS

1. In a significant number of cases the causes of poor results or death following mitral commissurotomy are avoidable or correctable, either partially or completely.

2. The production or increase in preexisting mitral insufficiency can be minimized by observing certain mechanical and technical precautions as they relate to the anatomic structure and pathologic changes in the mitral valve.

3. A comparison of the results obtained from commissurotomy by different technics indicates that in the authors' hands the use of hook guillotine valvulotomes is less safe than other methods. Their experience with a new, safer, downward-cutting valvulotome is described.

4. Recurrent mitral stenosis, in all probability, can be made less frequent by the complete opening of both commissures, which should be possible much more frequently if improvements in technic are developed.

5. Acute hypotension with myocardial ischemia and failure is probably the initiating cause of many operative and postoperative deaths commonly attributed in the medical literature to such causes as "cardiac arrest," "cardiac failure," "myocardial insufficiency," "ventricular fibrillation," "postoperative hypotension," "uremia," "protracted hypotension," "renal failure," "anoxia cerebral," etc. Methods of avoiding these deaths are suggested.

RIASSUNTO

1. In un gran numero di casi la causa della morte o di un insuccesso dopo commissurotomia della mitrale può essere evitata o ridotta.

2. L'insorgenza o l'aggravamento dell'eventuale insufficienza valvolare può essere evitata o ridotta al minimo mediante alcune precauzioni di carattere tecnico.

3. Il confronto dei risultati ottenuti dalla commissurotomia eseguita con tecniche diverse sembra indicare che l'uso dei commissurotomi a ghigliottina è meno sicuro. Viene descritto dagli autori un nuovo valvulotomo che nelle loro mani ha dato risultati migliori.

4. La recidiva può essere resa meno frequente dall'apertura completa di entrambe le commissure; questo è possibile grazie ai miglioramenti tecnici.

5. L'ipotensione acuta con ischemia miocardica e insufficienza cardiaca è probabilmente la causa iniziale della maggior parte dei casi di morte intra- o post-operatoria, che di solito viene invece attribuita ad altre cause, quali l'arresto cardiaco, l'insufficienza cardiaca, l'insufficienza miocardica, la fibrillazione ventricolare, l'ipertensione post-operatoria l'uremia, l'ipotensione prolungata, la insufficienza renale, l'anossia cerebrale etc. Vengono suggeriti alcuni sistemi per evitare questi casi di morte.

RÉSUMÉ

1. Dans un nombre assez grand de cas les causes d'un mauvais succès ou de la mort suivant une commissurotomie mitrale sont de telles, qu'ils peuven être évitées ou atténuées, soit partiellement, soit complètement.

2. Le développement d'une insuffisance mitrale ou de son aggravation en cas qu'elle préexistait, peut être atténué, si certaines precautions mécaniques et techniques, concernant la structure ana-

mique et les lésions pathologiques de la valve mitrale sont prises.

3. Une comparaison des résutats obtenus de commissurotomies differentes techniques indique, que dans les mains des auteurs l'usage des valvulotomes crochet-guillotine est plus dangereux que des autres méthodes. Leur expérience avec un nouveau valvulotome, moins dangereux, coupant du haut en óas, est décrite.

4. Le récidivede la sténose mitrales serait probablement moins fréquent, si on ouvrait les deux commissures complètement, ce qui sera possible plus souvent après du progès technique sera développé.

5. L'hypotension aigue avec ischaemie et faiblesse myocardiaque ets probablement la cause principale de beaucoup de cas de mort opératives et postoperatives, qui dans la littérature médicale sont attribués à des causes telles que "arrêt cardiaque," "faiblesse cardiaque," "Insuffisance myocardiaque," "fibrillation ventriculaire," "Hypertension postopérative," "uraemie," "Hypotension trainante," "insuffisance rénale," "anoxie cérébrale" etc. On recommende des méthodes pour eviter ces causes de mort.

ZUSAMMENFASSUNG

1. Die Ursachen schlechter Resultate oder von Todesfällen nach Kommissurotomie der Mitralklappe lassen sich in einer erheblichen Anzahl von Fällen vermeiden oder völlig oder teilweise ausgleichen.

2. Die Schaffung einer Mitralinsuffizienz oder die Verstärkung einer bereits bestehenden lässt sich durch Beachtung gewisser zum anatomischen Bau und zu den krankhaften Veränderungen der Mitralklappe in Beziehung stehender mechanischer und technischer Vorsichtsmassnahmen auf ein Mindestmass herabsetzen.

3. Beim Vergleich der mit verschiedenen Techniken ausgeführten Kommissurotomien sich ergebenden Resultate findet der Verfasser, dass in seiner Hand die Anwendung des Haken-Guillotinen-Valvulotoms weniger Sicherheit bietet als andere Methoden. Er beschreibt seine Erfahrungen mit einem neuen, sichereren, nach unten schneidenden Valvulotoms.

4. Die Häufigkeit des Auftretens von Rückfällen der Mitralstenose lässt sich sehr wahrscheinlich durch eine völlige Eröffnung beider Kommissuren herabsetzen. Mit fortschreitender Verbesserung der Tecknik lässt sich aus voraussichtlich viel häufiger ausführen.

5. Die eigentliche Ursache, die vielen operativen und postoperativen Todesfällen zugrundeliegt, ist wahrscheinlich eine akute Herabsetzung des Blutdrucks mit Blutarmut und Versagen des Herzmuskels. In der Literatur werden solche Todesfälle gewöhnlich anderen Ursachen zugeschrieben, wie z. B. "Herzstillstand," "Herzschwäche," "Herzmuskelschwäche," "Kammerflimmern," "postoperativem Bluthochdruck," "Urämie," "langdauernder Blutdrucksenkung," "Niereninsuffizienz," "Sauerstoffarmut des Gehirns" usw. Es werden Vorschläge gemacht, wie solche Todesfälle sich vermeiden lassen.

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Bursts of cholera occurred throughout the Victorian age like the irregular striking of a crazy clock, and this eldritch warning quickened the sense of urgency about health, and caused many laws to be passed under the stimulus of panic. We might almost say that Asiatic cholera was the secret ally of Edwin Chadwick. He warned the English people that unless they swallowed a dose of his sanitary medicine, the cholera would return, and behold it did return, and Chadwick had the power of a Black Magician. He knew nothing of microbes, or the deadly power of the cholera germ to thrive in water, in milk, or on infected vegetables, but he believed heartily that it was caused by "contagion," which was the result of filth . . . The cholera cast its huge shadow of panic. The Presbyterians of Edinburgh appealed to the Home Secretary to announce a general Religious Fast as a way of deflecting the Divine Vengeance. But the Home Secretary happened to be Lord Palmerston, and before issuing his reply to the Scottish Ministers, he consulted the Board of Health. . . . The answer was duly published, and shocked the Presbytery. For Palmerston bluntly rejected the idea of a National Religious Fast. He said that the maker of the universe had established certain natural laws, on the observance or neglect of which depended the weal or woe of mankind. The best course which the country could follow to prevent the cholera was to use the interval before the next epidemic to carry out measures to remove sources of contagion, which if allowed to remain will infallibly breed pestilence and be fruitful in death, in spite of all the prayers and fastings of a united but inactive nation. . . . When man has done his utmost for his own safety, then it is time to invoke the blessing of Heaven to give effect to his exertions.

—*Williams*

Treatment of Aneurysms with Dermal Grafts

ROBERT J. MEADE, M.D., F.A.C.S., D.A.B.
AND
WILLIAM H. MEADE, M.D., F.A.C.S.
LANSING, MICHIGAN

THERE has been a great increase in the number of elderly persons in the United States. The degenerative changes associated with old age, particularly in the vascular system, and the increase in the number of serious injuries, many of which involve the vascular tree, has heightened interest in the repair or replacement of diseased or injured segments of blood vessels. Furthermore, with improved anesthetic technic and the radical surgical procedures now employed in the attempt to eradicate cancer, repair or replacement of segments of the vascular tree is more imperative. The problem is far from new. Aneurysms were described in the ancient literature, though little is recorded of their treatment. In more modern times a number of methods of approach have been described and advocated. Among these are ligation, proximal to the aneurysm, distal to the aneurysm and a combination of the two;[1] endoaneurysmorrhaphy;[2] intravascular wiring;[3] external reinforcement of the wall with cellophane[4] and various plastics,[5] with the production of fibrosis; resection of the diseased vessel and replacement with homografts[6] or venous autografts, and resection of the vessel and restoration of continuity by means of various plastic fiber tubes.[7] In the past three years the two methods last mentioned have been used, with a high percentage of successful results. When feasible, these appear to be the methods of choice.

In some cases it may not be feasible to resect the entire diseased portion of the vessel, because of the loss of circulation to some vital part. After resection the condition of the remaining portion of the vessel may warrant reinforcement. Procurement of a satisfactory supply of homografts remains a serious problem. Grafts of fascia lata have been advocated and reported successful.[8] The strength of fascia lata, however, is great in only one direction; transversely this fascia is rather weak.

Dermal grafts for repair of the dura, incisional hernias, fractures, arthroplasties of the knee, hip and elbow joints and dislocation of the shoulder, have been reported as early as 1913. Cannady,[9] in 1942, reported 5 cases in which dermal grafts were used in repair of extensive hernias and of a patellar tendon. Previously, dermal grafts had been used by Straatsma,[10] Smith, Brown and several others in the repair of contour defects around the face and nose. Peer,[11] Harkins[12] and Horton[13] have reported clinical and experimental studies on the fate of buried dermal grafts in subcutaneous tissue, muscle and peritoneum. The presence of epidermal appendages and small inclusion cysts was noted for a relatively short time after implantation, but these later disappeared, except for some small residual inclusion cysts. After a year some of these cysts appeared to be invaded by granulation tissue and it was concluded

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that eventually they would become fibrosed.

Longmire[14] reported the use of a split graft for reinforcement of the suture line in the aorta, after thromboendarterectomy, for localized occlusion in the terminal portion of the aorta. No infection developed and a satisfactory result was obtained. Gray, Mansberger and Yaeger[15] reported studies on the fate of buried full thickness skin in 1951. They reported the occurrence of inclusion cysts and nonunion between the epithelial surface and the underlying fat. For this reason, they advised against the use of buried full thickness skin.

Dermal grafts provide strong elastic sheets, with opportunity for vascularization, both superficial and deep. Reports of their successful use in the treatment of large abdominal hernias have suggested perhaps this tissue would provide adequate reinforcement for damaged or diseased arterial walls and might have value in the reinforcement of suture lines or areas of weakness in the walls.

REPORT OF CASES

C. W., whose exact age was unknown but who appeared about 65 years old, was first seen at St. Lawrence Hospital on Dec. 16, 1950, for treatment of injuries, the result of his being struck by an automobile. The patient was conscious, but confused. Marked periorbital hematoma, and compound fractures of the right tibia and fibula, dislocation of the right shoulder and multiple abrasions were observed. The liver was palpable 2 fingerbreadths below the costal margin, and there was marked tenderness in the lower part of the abdomen. The shoulder dislocation was reduced, and the injured lower extremity was treated in Buck's traction, with a Kirschner wire through the os calcis.

After three days the sensorium cleared and the patient's general condition appeared fairly good. He continued, however, to complain of abdominal pain, and at this time a large mass was palpable below the umbilicus. The patient was seen in consultation by Dr. William Meade, who made a diagnosis of aneurysm of the abdominal portion of the aorta.

The size of the mass increased slowly, and there was continued evidence of peritoneal irritation, which suggested the possibility of a small perforation.

The Kahn test gave negative results, and studies of the blood and urine revealed no essential abnormality.

Because of the increasing size of this mass, it was decided that surgical treatment was indicated. On Jan. 22, 1951, the patient was taken to the operating room for an exploratory laparotomy. The abdomen was opened and the small bowel displaced into the right upper quadrant to expose the abdominal mass. There was pulsation in the iliac arteries, indicating patency of the aneurysm. The mass extended from the renal artery to the bifurcation of the aorta. The peritoneum overlying the mass was incised, and the peritoneum was dissected free from the arterial wall anteriorly. A needle was inserted into the aorta above the mass, and 20 cc. of diodrast was injected, after which a roentgenogram was obtained. This showed that there was considerable clot in the aneurysm, as the radiopaque material "puddled" to the periphery. An attempt to insert a stainless steel wire into the aneurysm to increase the clot was unsuccessful. Two soft spots in the wall of the aneurysm were noted anteriorly, just above the right and left common iliac arteries. Reinforcement of the aneurysmal wall with dermal grafts was decided upon. Full thickness skin grafts were cut from the left thigh with the dermatome. The graft was then split, and the superficial portion was sutured over the donor site. The dermal grafts were placed over the anterior and lateral walls of the aneurysm, where it was sutured above to the wall of the aorta and below to the common iliacs (Fig. 1*A*). The posterior peritoneum was then replaced over the dermal grafts but not closed. The anterior peritoneum was closed with continuous No. 00 chromic catgut. No. 24 through-and-through stainless steel wires were placed through the abdominal wall. The fascia was then closed with interrupted No. 00 silk. The subcutaneous fascia and skin were closed with No. 80 cotton. The wire stay sutures were then tied, and the dressing was applied.

The immediate postoperative course was uneventful. The patient was given penicillin, 100,000 units every three hours, and streptomycin, 0.5 Gm. twice daily. His temperature rose to 103.6 F. on the third postoperative day, and from then until the time of his death

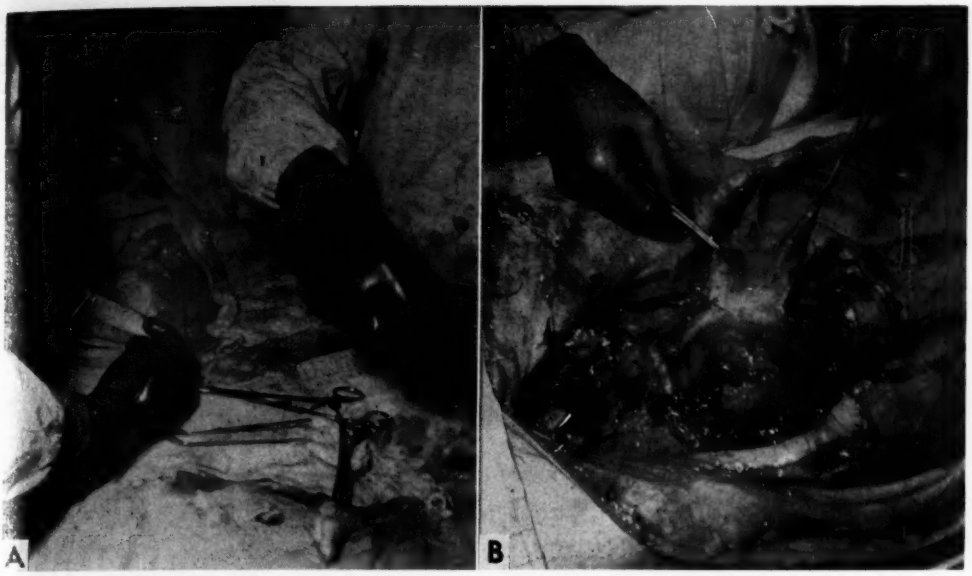

Fig. 1.—*A*, abdominal aortic aneurysm partially covered with dermal grafts. *B*, dermal graft partially removed from abdominal aortic aneurysm at autopsy.

it ranged from 100.0 to 101 F. About 6 p.m. on January 29, while the patient was on the bedpan, he experienced a severe pain in the abdomen and quickly went into shock and died.

At autopsy, rupture of the aneurysm on the right side, just above the iliac artery, was observed. This was just within the lateral margin of the skin graft. The pathologist's report was as follows: "The aneurysm began at the diaphragm and ended at the bifurcation of the aorta at the iliac artery. The aneurysm was carefully exposed. The renal arteries were examined. They were not involved. Three large skin grafts were observed over the anterior surface of the aneurysm. These grafts exhibited evidence of healing. They were adherent to the underlying tissue (Fig. 1*B*). Beneath one graft there was a collection of blood, which was of recent origin. The layer of blood was about 0.5 cm. thick. The area of rupture of the aneurysm was identified on the right posterior side. This was lateral to the skin graft. There was a huge rent, 10 cm. in length. The edges of this rent were irregular and hemorrhagic. Huge clots of blood were extruded through the rent. Large masses of laminated clot were observed immediately beneath the surface of this opening. The wall of the aneurysm, in the region of the rupture, was extremely thin, soft and necrotic. It measured no more than 2 mm. in thickness. The aneurysm was fusiform, measuring up to 15 cm. in diameter. The iliac arteries were traced downward. The openings into the iliacs were diminished in caliber but were patent. There was no evidence of any dissection of the aneurysm into the renal arteries or into the iliac arteries. There was no evidence of dissection of the aneurysm within the aorta itself.

"The aorta exhibited moderate to marked atherosclerosis of the ascending and descending portions respectively, and an extreme degree of atherosclerosis of the abdominal portion. As aforedescribed, almost the entire abdominal portion of the aorta consisted of an aneurysm. The wall of the aneurysm was made up almost entirely of laminated blood clot. The media and adventitia were identified in most areas. The intima was thick and was made up of large atherosclerotic plaques. There was no evidence of syphilis. In the region of the rent there was a disruption of continuity of the wall, with marked recent hemorrhage. Numerous special sections were made of the skin grafts over the anterior surface of the aneurysm. The wall of the aneurysm in some areas was extremely thin and amounted to nothing more than a thickened intima, to which the subcutaneous tissue of the skin

graft appeared to be adherent. The skin grafts exhibited excellent healing. There was marked fibroblastic proliferation, and the formation of new blood vessels was noted. There were a few macrophages and numerous multinucleated giant cells of the foreign body type. Proliferation of the capillaries was observed. Under some of the pieces of skin there was evidence of old hemorrhage, which showed organization with beginning fibroblastic proliferation. There was also evidence of recent hemorrhage, which was observed between the wall of the aneurysm and the superimposed skin graft."

CASE 2.—W. M., a white man aged 56, was admitted to the St. Lawrence Hospital on Feb. 24, 1953. His admission complaints were of pulsating masses in both thighs. In the winter of 1951, while shoveling snow, he had a sudden pain in his right thigh. Throbbing pain in the right thigh continued, radiating to the knee; he also had some pain in the medial aspect of the left thigh. About four months prior to his admission he noted the pulsating masses in his thighs.

The significant events in the past history were an attack of inflammatory rheumatism in 1931 and a coronary occlusion in 1944.

The blood pressure in millimeters of mercury was 135 systolic and 80 diastolic. There was no clinical evidence of cardiac abnormality other than an occasional extra systole. There were pulsating masses in both thighs; 3 by 5 cm. on the right and 2 by 2 cm. on the left. The femoral, popliteal, dorsalis pedis and posterior tibial pulses were present bilaterally. Laboratory work revealed no abnormality.

On Feb. 25th, 1953, a bilateral lumbar sympathectomy was done and an arteriogram taken. A fusiform aneurysm in the right femoral artery was noted to extend from the deep femoral to the adductor canal. On the ninth postoperative day there was evidence of infection in the incision on the left side, and this area was drained. The subsequent course was uneventful, and the patient was discharged from the hospital on March 8, with instructions to occlude, intermittently, the femoral arteries below the inguinal ligament.

He was readmitted to the hospital on April 29, and on the following day a dermal graft was applied to the right femoral artery (Fig. 2*A*). The graft was sutured in place with No. 000000 black silk, and the wound was closed with No. 80 cotton. Postoperatively the patient was given penicillin, 400,000 units every three hours, and dicrysticin, 1 ampule every twelve hours. The maximum postoperative temperature was 99.4 F. On May 2 it was noted that the dorsalis pedis and posterior tibial pulses at the ankle were good. The postoperative course was uneventful. On May 14 the donor site was dressed and, except for scattered small hematomas beneath the graft, was healed. The patient was discharged from the hospital on May 14.

He was readmitted May 16 with thrombophlebitis of the right leg. Dicumarol was administered, and he responded well. He was discharged May 30, having been provided with an elastic stocking.

He was readmitted on Aug. 31, for reinforcement of the left femoral artery with a skin graft. On this admission he was somewhat anemic; the value for hemoglobin was 11.6 Gm., or 75 per cent. On the following day he was taken to the operating room and a spinal anesthetic was administered. The femoral artery was dissected from above the origin of the deep femoral to the origin of the popliteal, and the wall was reinforced with a dermal graft (Fig. 2*B*). When the operation was completed it was noted that the foot was cold and dusky. No popliteal, dorsalis pedis or posterior tibial pulses were palpable. It was the impression that thrombosis of the femoral artery had developed and further operative intervention at this time was contraindicated. On return to his room anticoagulant therapy was begun; heparin, 50 mg. every three hours, given intravenously, and dicumarol, 300 mg., given orally.

At 10 p.m. on the night after the operation, examination showed a cold, blue left foot. The patient was returned to the operating room, and spinal anesthesia was induced. The popliteal artery was exposed and thrombosed. The vessel was opened, and a considerable amount of clot was removed by suction, but there was no evidence of bleeding from the proximal end of the artery. The lower end of the femoral artery was exposed and opened. More clot was removed, but the free flow of blood was not reestablished. The artery was closed and ligation carried out above the arteriotomy site. The color of the extremity was not improved, and although it was hoped that collateral circulation might suffice to sustain the extremity, it was considered probable that amputation would be necessary. On the patient's return to his room, antibiotic and anticoagulant therapy were reinstituted. On September 1 bleeding from the donor site was noted and the patient went into shock. He responded well to blood

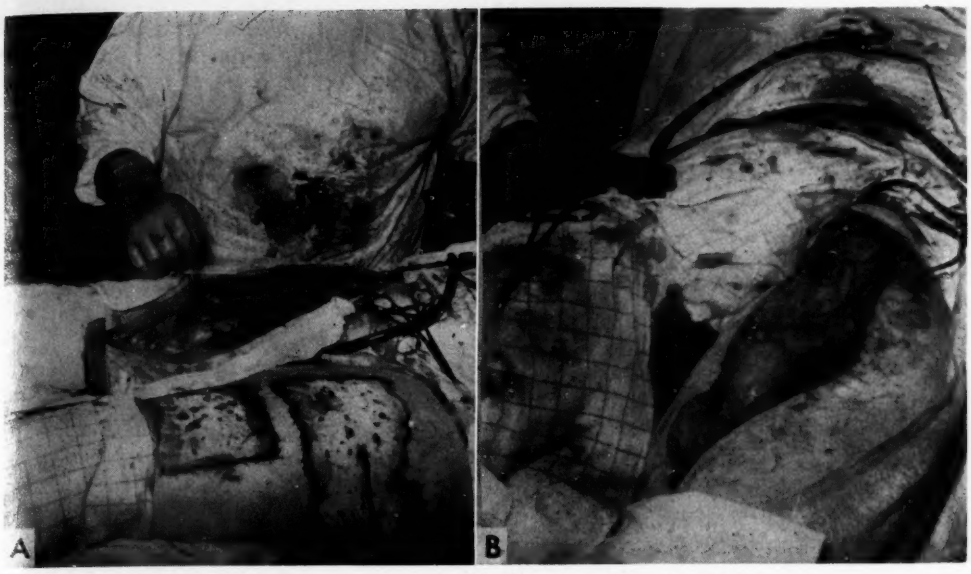

Fig. 2.—*A*, right femoral aneurysm covered with dermal graft. *B*, left femoral aneurysm covered with dermal graft.

therapy. On September 11 a supracondylar amputation of the left lower extremity was done. The lower part of the aneurysm and graft were removed. The subsequent hospital course was uneventful. The maximum postoperative temperature was 100 F.

The patient was eventually fitted with a prosthesis, which he has worn without unusual difficulty. He has since moved to California, and a communication from his physician was received on Aug. 10, 1955, stating that the patient was concerned about the enlargement of a pulsating mass in the right thigh, over the femoral canal. On examination, the right thigh and leg were normal as to warmth. A moderately large pulsating mass, measuring 10 by 4 cm., was palpable along the femoral canal, transmitting pulsation with the cardiac beat. There was no edema of the leg. There were no changes of the nails or nailbeds. The peripheral pulses were palpable. There was some discomfort on walking, although it was not severe.

CASE 3.—H. D., a Negro aged 72, was admitted to the St. Lawrence Hospital on Oct. 31, 1954, complaining of intermittent numbness of the fingers of the left hand for the previous three months. About two weeks prior to admission he had found himself unable to pick up objects with the left hand.

At the age of 8 years the patient had fallen and injured his spine. Muscular atrophy of the lower extremities resulted, and he had used crutches since.

The blood pressure in millimeters of mercury was 160 systolic and 90 diastolic. There was severe scoliosis to the right, as well as lumbar lordosis. The muscles of the lower extremity were contracted, and all joints were in a position of flexion but could be passively fully extended and flexed. The left hand was cold and weak. There was no radial or brachial pulse. There was a pulsatile mass in the lateral axillary wall. Sympathetic blocks caused no improvement in the condition of the hand. On November 3 the aneurysm was opened, and a thrombectomy in the brachial and radial arteries was carried out. Pulsation at the wrist returned but was poor. The color and temperature of the hand showed no change. The impression was that the palmar arches were probably thrombosed, as well as the brachial and radial arteries were thrombosed. Postoperatively, antibiotic and anticoagulant therapy was given. On November 5 the hand was still cold and weak. At about 4:30 p.m. on that day there was some bleeding through the dressing. It was not considered significant.

There was little change in the patient's condition until November 13, at which time he

went into profound shock. He was given plasma and blood and taken to the operating room. The brachial wound was opened and the clot evacuated. Bleeding from the aneurysm was noted, and the defect was closed with No. 00000 black silk. A graft was cut from the lateral surface of the arm and the epidermis removed by scraping. This was placed over the suture line. On November 20, gangrene of the tip of the thumb, index and middle fingers was noted. There was also some necrosis of the skin in the interdigital webbing between the thumb and index finger. On December 31 the tips of the thumb and index finger were ampuated and the necrotic skin of the webbing removed. At this point it was obvious that the intrinsic muscles of the lateral half of the hand, as well as the tendon to the index finger were necrotic. On Jan. 31, 1955, the index finger was amputated subcutaneously, and the skin was used to cover the defect in the interdigital webbing. On February 28 the patient was discharged.

At the most recent examination, on September 3, the brachial and radial pulses were absent; the hand was warm, and there was evidence of loss of the intrinsic musculature of the lateral half of the hand and contracture of the intrinsic musculature to the little and ring fingers. Flexion of the remaining fingers and thumb was extremely limited, and the patient had no grasping function whatsover. In spite of this, the extremity is more useful to him than a prosthesis would ever be.

COMMENT

Three cases in which dermal grafts were used to reinforce the walls of aneurysms and 1 in which it was used to reinforce the suture line after aneurysmorrhaphy are reported. The use of this procedure is not advocated as a replacement for arterial homografts, but rather as a supplement in the treatment of injured or diseased vessels. Because of the elasticity and strength of the dermis, and because of its incorporation as living tissue when buried in the tissues of the body, it has excellent properties for the reinforcement of blood vessel walls. With the advent of the antibiotics, infection about these grafts, when they are used intelligently, is uncommon. Foreign body reaction does, of course, occur early, but not intensely enough to cause extrusion or absorption, unless there is associated infection.

From our experience with the skin in its normal relation to the body, one would expect that these grafts would stretch with the repeated increase and decrease of pressure in the artery. Even with this stretch, however, a considerable amount of its strength would be retained, and the likelihood of rupture of a vessel would be considerably diminished, but that the aneurysm would continue to increase in size. This was borne out in the case in which the femoral aneurysms were reinforced. In the case of abdominal aneurysm the vessel was not completely encircled with the graft. It will be noted that the rupture occurred, not in the area which at operation appeared to be the most vulnerable, but farther back, near the margin of the graft. A minimal amount of dissection was done around this aneurysm, as it was feared that it might rupture during the operation. Had the skin grafts completely ensleeved the aneurysm, it is possible that we could have postponed rupture for quite some time. In the third case a relatively small graft was used, primarily to reinforce the suture line and prevent further bleeding in the site of aneurysmorrhaphy.

It is obvious that replacement of the diseased or injured vessel with a graft is a more desirable procedure. The procurement of satisfactory homografts, however, continues to be extremely difficult, and it may be that reinforcement of an aneurysm may help to sustain life until a satisfactory replacement segment can be obtained. Plastic replacement tubes give promise of being a satisfactory substitute for segments of the larger vessels, but thrombosis in these tubes continues to present difficulties, and it would appear that perhaps the use of such tubes, reinforced with dermal grafts, might make anticoagulant

therapy in the postoperative period less dangerous, and thereby improve the handling of these difficult vascular problems.

The dermal grafts used were cut by setting the Padgett dermatome at its maximum depth and then resetting the knife and splitting the grafts, so as to leave a relatively thin superficial layer, as has been pointed out by Zintel.[16] This can be replaced on the donor site to insure healing. Maximum setting of the dermatome will not always provide a full thickness of skin, but the remnant of dermis is so thin as to present a problem of healing if not recovered.

SUMMARY

A review of the uses of dermal grafts is presented, with a résumé of the treatment of aneurysms. Three cases are presented in which dermal grafts were used in the reinforcement of aneurysmal walls or reinforcement of an arterial wall following aneurysmorrhaphy. Dermal grafts are satisfactory tissue for reinforcement of vessel walls.

ZUSAMMENFASSUNG

Es wird ein Überblick über die Verwendung von Hauttransplantaten unter Berücksichtigung der Behandlung von Aneurysmen gegeben. Drei Fälle werden dargesetellt, in denen Hauttransplantate zur Verstärkung der Wände des Aneurysma oder zur Verstärkung der Arterienwand nach Aneurysmaoperation angewandt wurden. Hauttransplantate sind ein geeignetes Gewebe zur Verstärkung von Gefässwänden.

RÉSUMÉ

L'auteur fait une revue sur l'utilisation des greffes de peau et il donne un résumé sur le traitement des anévrismes. Il présente aussi trois cas pour le traitement desquels il a utilisé des greffes de peau pour renforcer les parois d'anévrismes ou pour rendre plus forts les parois d'une artère après une anévrismorrhaphie.

D'après l'auteur les greffes de peau sont des tissus très satisfaisants pour renforcer les parois des vaisseaux.

RIASSUNTO

Vengono passati in rassegna i metodi del trapianto dermico nel trattamento degli aneurismi. Vengono presentati tre casi in cui la parete dell'aneurisma fu rinforzata con un trapianto dermico dopo aneurismorrafia. Questo tipo di trapianto si dimostra soddisfacente.

SUMÁRIO

É feita uma revisão do uso dos enxertos de derma, com um resumo do tratamento dos aneurismas. São apresentados três casos em que foram usados enxertos de derma para reforçar as paredes aneurismaticas ou para o reforço de uma parede arterial após a aneurismorrafia. Os enxertos de derma representam tecidos satisfatorios para o reforço das paredes de vasos.

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Most surgeons, in however general a way they have started and however "general" they may wish to remain, become to some extent specialists as they grow older, because they are attracted more and more to work of a special kind, because chance association or some feature of the district in which they work brings them many cases of a particular nature, or because they are recognized by their fellows as being unusually skilled in some form of treatment, and are asked to undertake it to an extent that practically excludes other work.

Such specialization, which is the natural outcome of a man's inclinations and ability, is inevitable, indeed highly desirable. All specialism, whether medical or surgical, has originated thus in the vision, energy, and enterprise of one man or a group of men, but it tends to be perpetuated by men of a different type. It is against the closed shop, designed to keep the privileges and emoluments of practice to those within the fold, removing its recruits at an early age from the competitive struggle of general medicine and surgery, and tending therefore to attract men in search of safety and an assured income rather than of adventure and discovery, that criticism must be levelled.

—Ogilvie

Present Conceptions of Varicocele and its Treatment

EURICO BRANCO RIBEIRO, M.D., F.A.C.S., F.I.C.S.*

SAO PAULO, BRAZIL

IDEAS about varicocele are so many and at the same time so contradictory that it would be boring to review and analyze each of them carefully. Different opinions are still expressed; old arguments already perishing are remembered, and unreasonable ideas are still often spread, owing to a lack of wise criticism. Space does not permit me to discuss those different ideas, to exterminate old arguments and to reveal the unreasonableness of some of the opinions.

I shall, therefore, mention only the points I consider essential to a good idea of varicocele, exactly as it should be understood in accordance with current knowledge.

We call varicocele a tumor of varying volume and consistency that results from the expansion, extension and torsion of the veins of the spermatic cord and the corresponding scrotum. What is really observed, however, is the expansion, extension and torsion of the scrotal veins, as in the cord, only on a level with the pampiniform plexus, i.e., only off the fibrous tunic that enfolds this plexus can the unusual increase of the veins' caliber be observed.

From these facts one may draw a first conclusion: The veins become varicose where there are no rigid tissues to restrain them, but they permit easy expansion of the force coming from inside the circulatory current in the areas of soft cellular tissue, adjacent to the skin and highly elastic.

The varicocele does not occur in many men, but it does occur in some, even with the same anatomic conditions of the region affected. One easily arrives at the conclusion that the patient with varicocele is under influences capable of increasing the tension of the blood in the scrotum veins.

"That means the inversion of the spermatic venous current," quickly explain the most outstanding authors of our day. If the current is inverted, it is a proof that an endovasal force exists, which, besides being capable of exceeding and stopping the physiologic influx, can also compel it to return to the antiphysiologic current, looking for new anastomotic channels that will finally allow it to drain in the great venous central canal, the lower vena cava.

But now we ask: "What is the reason for the venous reflux through the spermatic vein?" In reply to this question we would probably get the most absurd answers, anatomically speaking. As the varicocele is often located in the left side and only unusually in the right, among other reasons, the following were presented: the compressive consequence of the

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*Director of the Sanatorio Sao Lucas, Sao Paulo, Brazil.

descending colon, a greater extension of the spermatic vein at the left, and its disembouchement at a right angle in the left renal vein, while at right it disembouches at an acute angle in the lower vena cava. It is easy to see that such arguments are nonsense. Intraperitoneal compression by the normal organs is practically the same for all patients; the greater extension of the left spermatic vein would be considered only if varicocele occurred in very tall men and never in short ones, thus indicating some influence of the greater or less length of the vein; the disembouchement at a right angle of the left spermatic vein, in the left renal vein, would better justify the more rapid deflux of the normal circulation of the spermatic vein, as the left renal vein gives away a great quantity of blood and then requires greater speed flow. This would establish a kind of siphon movement which would facilitate the draining of the spermatic vein instead of producing the reflux there; and at right, disembouching at right angle in the lower vena cava. The spermatic vein would have to support a voluminous column of liquid that theoretically would facilitate its reflux. In practice that does not occur.

Referring to the nonexistence of valves —which is another resort to explain the inversion of the current—if we find anatomists who mark it out, we also find writers, e.g., Winsbury White, who maintains that the pampiniform plexus enfolds many valves. Some writers, like Revington, have said that there are valves on a level with the orifice of both the spermatic veins. Opposing statements obviate any conclusions about the role of valves in the development of varicocele.

It has been clearly proved that there is a venous reflux. Through many works of Eduardo Cotrim and Jarbas Barbosa de Barros of Brazil, as well as from works by Ivanissevich, Bernardi and others, of Argentina and, even more recently, from researches of Abdel Rahman and Edward Mina* in Egypt, it has been proved that the circulatory current of the spermatic vein in the patient with varicocele, when he stands up, appears inverted and the venous drainage takes place through the vas deferens and the funicular vessels, then reaches the hypogastric, the epigastric and even the saphenous and pudendal veins on the opposite side, forming a large network of venous origin.

It has also been proved that the reflux is not permanent but intermittent. It occurs when the patient is standing up and increases when he makes a certain kind of physical effort, disappearing when he is in the decubital position. Roentgen tests of this are conclusive.

But what causes the "deflux"?

There is no doubt that it is caused by a total or partial intermittent interruption of the venous current, on a level beyond the spermatic vein, so as to derive from it, totally or partially, the great mass of blood which flows out from the kidney. What kinds of interruption of the current can account for this? They can be classified into three types: (1) pathologic formations; (2) anatomic elements, and (3) anatomic anomalies.

1. The venous compression produced by pathologic adhesions due to tumors of renal origin and to swollen glands, has been pointed out as the essential cause of the varicocele called "symptomatic," because the varicocele, in the symptomatic picture of the morbid process, appears as one of the elements of diagnosis. All authors agree on this point.

2. Among the anatomic elements capable of producing compression of the left renal vein, the first pointed out is the one called aorta-superior mesenteric compass, i.e., the acute angle formed in the place of origin of the superior mesenteric artery

*Rahman, A., and Mina, E.: Anatomical and Surgical Aspects in the Operative Management of Varicocele, Urol. & Cutan. Rev. 44:257 (May) 1950.

of the abdominal portion of the aorta. Exactly at that point, and taking a transverse direction, is regularly situated the left renal vein. Now in a tall and visceroptotic patient in certain postures—marching or making physical effort—the superior mesenteric artery may temporarily remain stretched, compressing the left renal vein, which has soft walls, against the rigid walls of the abdominal portion of the aorta. This probably causes a total or partial stop of the venous circulation.

I am not presenting mere theoretical possibilities. Several arguments convince me that the compression of the left renal vein by the aorta-superior mesenteric compass may occur. First, varicocele occurs by far the most frequently in tall, thin men, in whom this compass is more nearly closed, and seldom in short, fat men, in whom it is more open and invested of subperitoneal adipose tissue. Second, it can be assumed that compression by the compass is considered by classic authors to be the pathogenic agent. This is well known in the case of the compression of the terminal part of the duodenum by the superior mesenteric artery toward the aorta, producing expansion, upper stasis and digestive troubles, sometimes of great intensity, in such a way as to force deviation of the trajectory of the food bola by means of gastrojejunostomy, after the always advisable adequate gastric resection. If the aorta-mesenteric compression may be prejudicial to the duodenum, which has large and elastic walls, I am convinced that it influences even more intensely, and with greater prejudice, the soft and flexible walls of the left renal vein. This is undoubtedly the reason one encounters more cases of varicocele than of duodenal disturbances due to this cause. I have already published a roentgenogram of a patient with varicocele, which shows the duodenum compressed by the aorta-superior mesenteric compass and the concomitance of the etiologic agents.

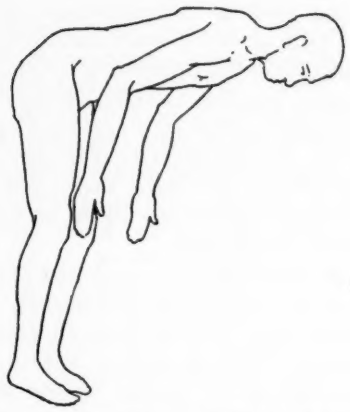

Fig. 1.—The "bow signal" (see text).

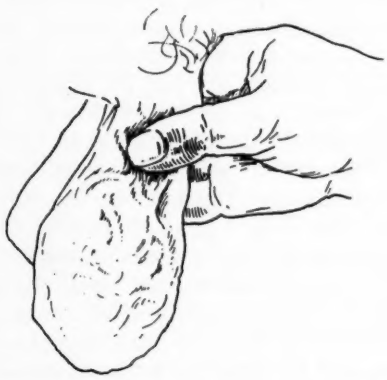

Fig. 2.—Note remarkable decrease of tension in ectatic veins.

Another anatomic structure that can be presented as a probable cause of compression of the left renal vein is the Treitz ligament; as it stretches through the intestine in the visceroptotic patient, it is also capable of provoking interruption of the venous circulation, which runs behind it.

Authors still point out the normal existence of a small lymphatic gland just under the place of origin of the superior mesenteric artery. This may be, if not the cause, at least an element that helps the

cause, in certain circumstances, of the painful passage of venous blood through the aorta-superior mesenteric compass.

Another argument, and a highly convincing one, is the fact varicocele never occurs in the quadruped. This has been pointed out by several authors, but they did not take advantage of it to present conclusive statements.

I have established *a priori*, and put into practice in a completely satisfactory way, a clinical sign of the so-called essential varicocele. This consists of examination of the decrease of venous tension in the veins of the hemiscrotum affected when the patient changes from an erect position to flexion of the trunk, bowing downward. I call this signal the "bow signal" (Fig. 1). It is easily tested as follows: With the patient standing up, the physician holds the affected hemiscrotum within the four fingers and the thumb, and he can then observe the remarkable decrease of tension in the varicose veins when the patient bows. The bow signal, therefore, shows that when the aortic-superior mesenteric artery compass opens, the blood starts to circulate again through the left renal vein, the reflux through the spermatic vein stops, and the tension on the ectatic hemiscrotal veins decreases (Fig. 2).

3. There is still something to consider: the occurrence of anatomic anomalies capable of producing interruption of the normal drainage of the left renal vein. Among the anomalies pointed out, it is convenient to state the outstanding anomalies marked by the retroversion of the left renal vein in relation with the abdominal portion of the aorta. It is easy to understand that, when such anomalies occur, the venous blood of the left renal vein will have to drain through a narrow passage between the tight walls of the abdominal portion of the aorta and the tough surface of a vertebral body. In such cases one should not even attempt to secure an intermission of the compression, but only a partial permanent compression, or even a total definitive interruption obtained with the growing of the organism to maturity.

The question of anomalous trajectories of the left renal vein and their relation to varicocele are being carefully studied at the Faculdade de Medicina de São Paulo (Medicine University of São Paulo, Brazil), by Dr. Liberato João Affonso Di Dio, of the Department of Anatomy of that distinguished center of education and research. They have there a collection of almost 200 cadavers, of different ages and races. I hope that Dr. Di Dio's researches will confirm the ideas here presented as to interruption of the left renal venous flow on a level with the aorta.

If this really takes place, it could seem strange that all the intense flux of the blood that flows out from the left renal vein is accomplished through the reflux noted in the spermatic vein, since the velocity of the circulating mass would be such that it would hardly occur to anyone to mention venous stasis in connection with varicocele. The fact is that, in addition to the deviation of the spermatic system, the venous circulation also starts running, for the most part, by means of a powerful net of anastomoses that grows around the left kidney and has been particularly studied by Fagarassanu. It is a collateral system of opposite appearance, with the venous system at the right, and it allows the left renal venous blood to get to the heart without using either the truncal way or the longer and more complex trajectory through the spermatic vein. These vessels originate in the left renal vein before its crossing with the aorta and anastomoses with the azygos vein and with the vena cava, passing in front of the aorta or behind it, establishing what Fagarassanu so aptly called reno-azygos, preaortic renocaval and retroaortic reno-caval "safety conduits." This

system specially guarantees the efficiency of the return circulation of the left kidney.

It is easy to understand, therefore, why the kidney does not suffer when one tries to cure varicocele by tying the veins of the pampiniform plexus of the veins of the spermatic trunk.

If Fagarassanu's "safety conduits" are still not sufficiently developed to fulfill the abrupt deficiency associated with interruption of the spermatic vein, what will occur is expansion of the remaining part of the spermatic vein from the ligature to its disembouchement in the left renal vein, despite the pressure exerted by the abdominal wall and the abdominal contents upon the segment. This fact is well documented by a phlebogram on page 77 of the book *Varicocele*, by Ricardo Barnardi, in which are shown, in addition to the enlarged spermatic vein, the trajectories of two "safety conduits," one directed upward and inward and the other downward and inward.

In such an emergency the return circulation of the testicle is accomplished through the many anastomoses that help carry the blood to the iliac veins, as I have already explained.

Once the problem of varicocele is understood, a clear conclusion appears. There is no need—and it may be even inconvenient—to interrupt definitively the circulation through the spermatic vein. The venous reflux is intermittent, and it would be difficult to remove its cause on a level with the aorta-superior mesenteric artery compass, it is only necessary to obtain also an intermittent and synchronic interruption of the spermatic vein to obtain the disappearance of the reflux. This is confirmed if one establishes a pulley on a level with the external orifice of the inguinal canal, by means of enbowing the tributary vessels of the spermatic vein, which are enclosed in a tunnel made by a fold of the great oblique muscle aponeurosis. Every time the patient makes a physical effort or remains in a position that causes interruption of the current through the left renal vein, this same effort or posture produces compression on a level with the pulley established near the external orifice of the inguinal canal, preventing the reflux of the venous blood through the spermatic vein.

In addition to guaranteeing the persistence of the pulley, fixation of the veins by means of a tunnel made of the great oblique muscle aponeurosis has the final result of making varicocele disappear and of correcting one of its most obvious symp-

Data on 272 Patients Surgically Treated Between 1936 and 1950

Race	*Number*	*Per Cent*
Negro	5	1.8
White	255	93.7
Halfbreed	12	4.4
Nationality	*Number*	*Per Cent*
Brazilian	233	85.6
Portuguese	19	6.9
Italian	7	2.5
Spanish	5	1.8
Argentine	1	0.3
Polish	1	0.3
Hungarian	1	0.3
Lithuanian	1	0.3
English	1	0.3
Age, Years	*Number*	*Per Cent*
10 to 15	8	2.9
16 to 20	78	28.6
21 to 25	66	24.2
26 to 30	39	14.3
31 to 35	28	10.2
36 to 40	19	6.9
41 to 45	13	4.7
46 to 50	9	3.3
51 to 55	10	3.6
56 to 60	1	0.3
61 to 65	1	0.3
Marital State	*Number*	*Per Cent*
Single	162	59.5
Married	108	39.7
Widowed	2	0.7

toms, namely, testicular ptosis. In fact, by suspending the varicocele veins and enclosing them in a tunnel of aponeurosis, one will obtain (1) correction of ptosis of the testicle; (2) repression of the veins affected among fibrous tissues, combating their expansion, and (3) distention of the veins affected, preventing blood stasis.

After reaching these results by tunnelization, I proceed to cure varicocele by an operative process, essentially conservative, which is easily performed in any surgical environment.

Surgical Technic. — The technic of the tunneling procedure is as follows:

1. The classic incision for repair of inguinal hernia is made (oblique, starting in the spine of the pubis and finishing about 2 fingerbreadths from the anterior and superior iliac spine).

2. The surface of the great oblique muscle aponeurosis is widely exposed, leaving the external ring of the inguinal canal visible.

3. The spermatic cord is grasped and widely exposed, from the external ring of the inguinal canal to the neighborhood of the testicle, which, for this reason, is pressed from the outside by soft traction exerted by the surgeon through the very same cord, helped by pressure made by the assistant through the scrotum and the clothes that cover the patient.

4. The fibrous tunic that enfolds the cord is opened, after which the veins are isolated by round dissection of the varicose veins, the vas deferens being separated from them, with its artery (*top*, Fig. 3). (One should bear in mind that this artery is not always visible.)

5. The vas deferens and its artery are left aside at the bottom of the operative site, between the pillars of the external orifice of the inguinal canal.

6. The ectatic veins are set over the great oblique muscle aponeurosis (*center*, Fig. 3), disposed in "straps" forming a horseshoe shape with the concavity turned downward, and inward, at such a height as to permit the superior pole of the testicle to remain a little lower than the spine of the pubis.

7. The veins so placed are fixed by means of a fold of the great oblique muscle aponeurosis, supported by separated points, so as to create a tunnel in which the veins are protected. The tunnelization starts in the higher part of the strap, perforating the aponeurosis from outside the strap foundation, and then from the inside, with the same thread, at such a distance that, when the knot is tied, the fold of the aponeurosis covers the venous trunk completely (*bottom*, Fig. 3), without interrupting its circulation. The same process is repeated at other points along the strap until the tunnel is completed. Care should always be taken not to strangle the venous current, which will then circulate through the free tunnel of aponeurosis. In certain cases when the patient is fat or the operative site becomes small the external branch of the tunnel may be constructed by fixing the aponeurosis to the subcutaneous cellular tissue in the vicinity of the crural arcade, this always being done by means of separated points.

8. The skin is sutured with agraphes, if necessary preceded by the subcutaneous cellular tissue approach.

The tunnelization may be performed with simple catgut No. 0 or 1, with Brady catgut No. 0 or with cotton thread. I have been using simple catgut or Brady catgut.

Spinal anesthesia allows easier handling of the great oblique muscle aponeurosis, but narcosis in a closed circuit, or any other well-carried anesthesia, provides a looseness of the fibers which tends to make the tunneling easier to perform.

The results of this procedure were remarkable in nearly 300 patients, 272 of

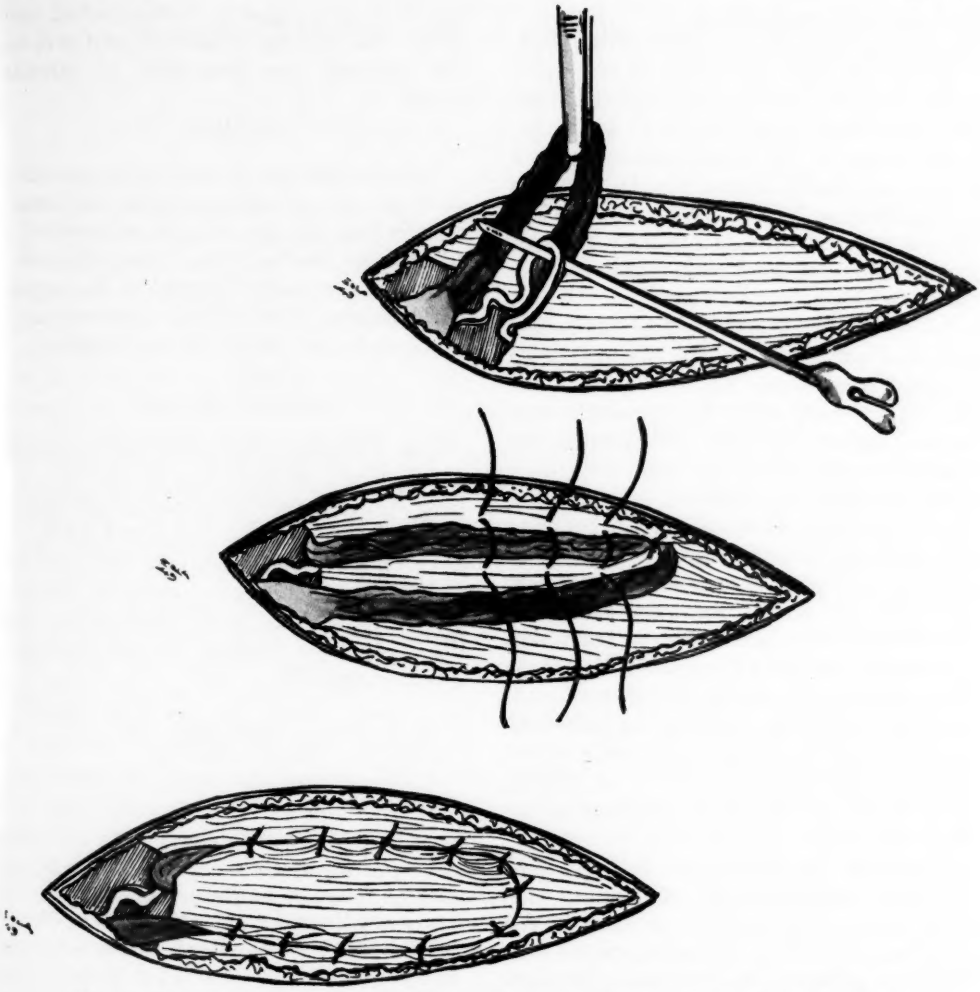

Fig. 3.—*Top*, vas deferens isolated from the cord. *Center*, venous loop applied to aponeurosis of external oblique muscle. *Bottom*, tunnel formed to enclose the veins.

whom (those operated on between 1936 and 1950) are classified as to race, nationality, age and marital status in the accompanying table.

The excellent results of the tunneling procedure have also been observed by many surgeons who perform it inside and outside Brazil, and the many appreciations written by outstanding foreign authors about it are really worthy of registration.

After a comparative study of the results obtained with several processes, Dr. Carlos A. Formenti and Dr. Horácio José Dorado, of Buenos Aires, in a very incisive manner, finish with these remarks: "Si a ello agregamos que la técnica de Branco Ribeiro es sencilla, facil, no traumatica, conservadora y se ajusta a los postulados anteriores, podemos dicir que por el momento es el procedimiento del

elección en el tratamiento del varicocele" (La Prensa Méd. Argentina 38:922, 1951).

Some time ago, in a personal communication, another surgeon of Buenos Aires, Dr. José Joel, said: "Efetivamente, hasta ahora ha sid el procedimiento suyo el que mas satisfaciones nos ha dado en el tratamiento del varicocele: los resultados son excelentes y immediatos." He confirmed these opinions in a published article (Dia Méd. 21:156, 1949).

In Argentina the tunneling procedure was recommended by Dr. Juan Carlos Guzzetti, who declared: "Soy un convencido de la efectividad de su método, que seguiré aplicando hasta que alguien me demuestre que existe algo más innocuo y mejor" — and by Ricardo Finochietto, whose judicious opinion was as follows: "La operación para el varicocele es la ñina mimada de nuestra escuela." His opinion has been echoed by the many surgeons who come to hear him and learn from him.

Recently Dr. Alex Higginson, Professor of Urology at the Medical Faculty of Lima, Perú, after performing the tunneling operation in 50 cases, wrote me: "Considero el procedimiento de Ud. el más de acuerdo com el cuerpo de doctrina actual del varicocele."

Protected by so many distinguished opinions, the tunneling procedure, now being adopted in many countries, in the near future will surely gain a more outstanding place in the treatment of varicocele.

SUMMARY

The author describes and recommends the tunneling procedure in the treatment of varicocele, which is now being tried and adopted in many countries and has been highly recommended by distinguished surgeons. The technic is outlined, and data on 272 patients are presented in tabular form.

SUMARIO

O Autor descreve e recomenda o processo do tunel para o tratamento da varicocele, método êste que tem sido experimentado e adotado em muitos paises e tem sido recomendado por muitos cirurgiões de nomeada. A técnica de tal método é apresentada, sendo dados os resultados em quadros.

ZUSAMMENFASSUNG

Der Verfasser beschreibt und empfiehlt das Tunnelungsverfahren in der Behandlung von Krampfaderbrüchen. Die Methode wird zurzeit in vielen Ländern ausprobiert und akzeptiert und erfreut sich der Empfehlung erstrangiger Chirurgen. Die Technik wird beschrieben, und die Ergebnisse werden in tabellarischer Form dargestellt.

RIASSUNTO

L'autore descrive e raccomanda la tecnica della tunnellizzazione nella cura operatoria del varicocele che ora sta entrando nella pratica generale. Ne descrive la tecnica ed espone i suoi risultati.

RÉSUMÉ

L'auter présente et recommande la méthode chirurgicale du "tunnelisation" pour le traitement de la varico cèle telle qu'elle est essayée et acceptée dans plusieurs pays par des chirurgiens distingués. L'auteur décrit la technique et il présente ses résultats au moyen de tableaux.

Classification of Tumors of Testis

M. M. MELICOW, M.D.*

NEW YORK CITY, NEW YORK

THE unique clinical course and remarkable pathologic picture presented by testicular tumors are of interest to clinicians, urologists and pathologists. The medical literature on the subject is voluminous, the terminology is extensive and the classifications are numerous, varied and at times confusing. Before presenting what I consider a logical "working" classification of tumors of the testis, a review of progress in the understanding of this disease is in order.

Historical Review (Table 1).—The first to record a tumor of the testis is said to have been St. Donat, who in 1696 identified a "rudimentary skull and pigmented optic cups in a scrotal mass." He must indeed have been amazed at such a finding! Prochaska in 1809, André del Perrone in 1838 and Johnson in 1856 recognized teratomatous testicular tumors. In 1854 Curling classified neoplasms of the testis into two groups: (1) benign cysts, and (2) malignant solid tumors. He believed that the latter developed in the region of the rete testis. In 1855 Verneuil described dermoids of the testis. In 1877 Langhans and Kocher reported on the microscopic picture of testicular tumors. Wilms, in 1898, noted the tridermal character of some of the growths and proposed the following classification: (1) embryomats ("cystic fetuses"), and (2) embryoid or teratomatous tumors ("solid non-fetal"). He subscribed to Marchand-Bonnet's theory that neoplasms of the testis arose from isolated blastomeres. Wilms further recognized the fact that in some cases one type of tissue tended to outgrow the rest and to dominate the picture. The Cohnheim theory of embryonic cell rest as the mechanism of tumor development was accepted by most pathologists, and in the case of neoplasms of the testis the growth was ascribed to inclusion of elements of the wolffian body in the developing gonad. All tumors of the testis were looked upon as teratomas. Many pathologists, however, continued to label the growths on the basis of component cells; and, since the latter varied considerably in different specimens, an extensive and unwieldy nomenclature was accumulated.

A change in point of view with regard to testicular growths occurred in 1906, when Chevassu observed that a large number of patients with neoplasms of the testis presented somewhat similar clinical pictures, as well as gross and microscopic features that were uniform. It was his impression that the component cells resembled those lining the seminiferous tubules. He concluded that they were not teratomas but rather growths composed of seminal cells or "seminomas." Other names that have been applied to this tumor are round cell sarcoma, embryonal sarcoma, large cell sarcoma, unicellular carcinoma, monocellular carcinoma, embryonal carcinoma with lymphoid stroma, spheroidal cell carcinoma, germinoma and dysgerminoma.

A controversy then arose among pathologists, and two schools of thought emerged. One held that *all* testicular neoplasms were *teratomas* and attributed the variations to the overgrowth of one or

*Assistant Clinical Professor in Urology, College of Physicians and Surgeons, Columbia University, and Uropathologist, Squier Urological Clinic, New York, N. Y.

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more cell elements, with partial or complete suppression of the remainder. Various names were used: teratomas, teratoid tumors, embryonal teratomas, embryonal carcinomas or embryonal sarcomas, teratocarcinomas, embryoid tumors, embryomas, etc. The other school divided tumors of the testis into 2 groups: (a) teratomas and (b) seminomas. The differences in the points of view continued until 1929, when Zondek reported the presence of prolan A in the urine of a patient with a tumor of the testis. Other investigators repeated the test in similar cases and confirmed the observation. Here was the first biologic test for one type of cancer! Enthusiasm ran high. Unfortunately the impression gained ground that *all* tumors of the testis induced a positive reaction, and that a negative one ruled out tumor. Some workers suggested that the amount of gonadotropic hormones excreted in the urine varied directly with the embryonal character of the tumor. The more embryonal it was, the higher the titer. It was even recommended that classifications, operative procedures and prognoses be based on the gonadotropin assay of urine. Then contradictions were discovered. There were many patients with proved neoplasms whose reactions had been negative. "False positives," on the other hand, were obtained from patients without testicular tumor, in cases of hydrocele and in patients orchiectomized for reasons other than neoplasm. Material for tests performed with concentrated urine specimens contained sufficient anterior pituitary-like hormone to give a pseudopositive reaction. Subsequently it was determined that only tumors that contained *trophoblasts* were associated with a positive reaction and that gynecomastia was the result of *hyperestrinism* from any source.

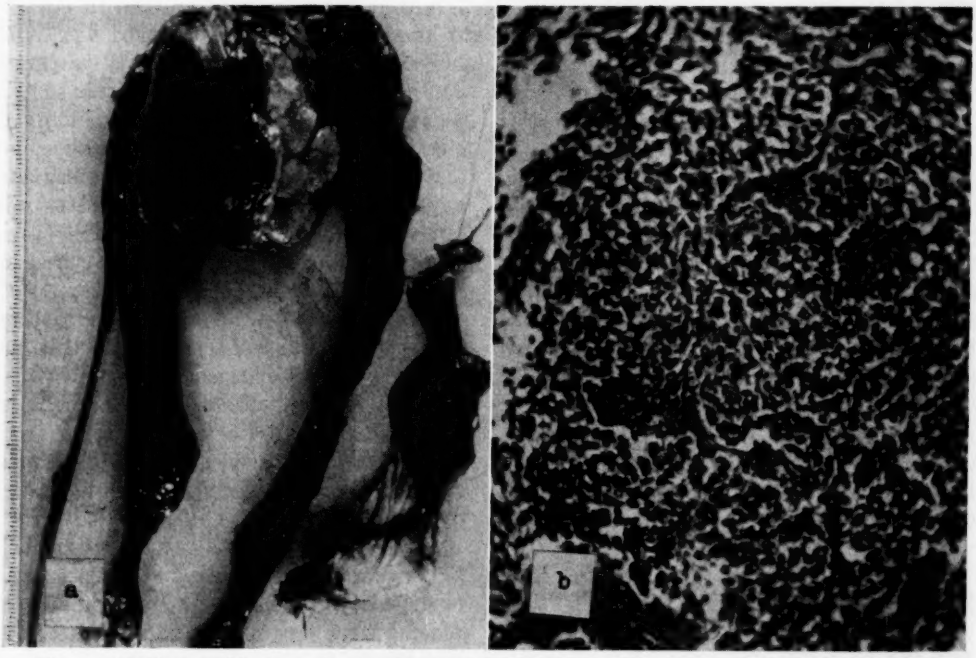

Fig. 1.—Radical orchiectomy for seminoma (*a*). Seminoma (*b*). Note unicellular character.

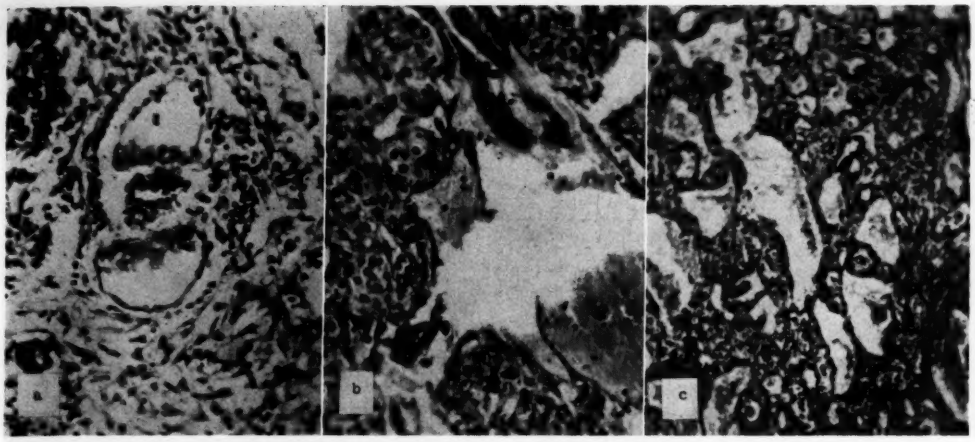

Fig. 2.—Embryonal carcinoma. Embryoid bodies or blastulas (embryoma), *a*; choriocarcinoma (note syncytiotrophoblasts invading blood vessel), *b*; embryonal carcinoma, *c*.

In the meantime it became apparent that the urine of patients with pure seminoma gave a negative reaction for gonadotropins. Thus the seminomas were established as an entity separate from the "teratomas." At present this division of the family of testicular neoplasms into two branches is accepted by most pathologists. The pathologic picture and clinical course of seminomas was fairly uniform, while the pathologic picture of the embryonal tumors was varied and the clinical course less predictable.

The terms used to designate the embryonal group of tumors, usually based on the histologic picture, continued to be extensive and confusing. Peyron and Limousin in 1936 and Melicow in 1940 observed embryoid bodies in a tumor of the testis. Similar observations were later (1946) recorded also by Friedman and Moore. The latter authors presented the following classifications:

1. Seminoma
2. Embryonal carcinoma
   Chorioepithelioma
3. Teratoma
4. Teratocarcinoma

Teilum compared tumors of the testis with those of the ovary (1944, 1950) and called attention to the homologous relation between neoplasms of these organs. His classification was as follows:

Type of Cell	*In Testis*	*In Ovary*
Tumors of gonocytes	Seminoma	Dysgerminoma
Tumors of Sertoli cells	Androblastoma	Androblastoma
Tumors of Leydig cells	Interstitial cell tumor	Arrhenoblastoma
Tumors of embryonal cells	Embryonal carcinoma	Embryonal carcinoma
Tumors of extracoelomic cells	Mesoblastoma	Mesoblastoma
Tumors of trophoblasts	Choriocarcinoma	Choriocarcinoma

I should like to present a classification of tumors of the testis which I consider logical and relatively easy to remember. It is based on 2 postulates:

1. That the majority of tumors of the testis arise from its component elements. The significant cells that comprise the latter are: (a) spermatogones ("germ"

TABLE 1.—*Contributions to the Study of Tumors of the Testis**

In 1696	St. Donat identified a rudimentary skull and pigmented opic cups in a testicular tumor.
In 1809	Prochaska, and in 1838 André de Perrone recognized teratomas.
In 1850	Leydig discovered interstitial cells.
In 1856	Johnson suggested tridermal composition of testicular neoplasms.
In 1865	Sertoli described the cells now bearing his name.
In 1872	Waldeyer reported an interstitial cell tumor.
In 1895	Sacchi reported pedomacrosomia in a boy with an interstitial cell tumor.
In 1896	Wilms stressed the tridermal origin.
In 1906	Chevassu ascribed unicellular tumors to adult seminal cells and proposed the term 'seminoma'.
In 1922	Ball reported interstitial cell tumors in dogs.
In 1926	Michalowsky produced teratomas in fowl by the injection of 5% zinc chloride solution.
In 1929	Zondek found Prolan A in the urine of a patient with teratoma testis.
In 1936	Limousin and Peyron, and in 1940 Melicow described embryoid bodies in a tumor of the testis.
In 1940	Hooker and Gardner found interstitial cell tumors in immature male mice receiving estrogen.
In 1945	Teilum reported a feminizing testicular tumor of Sertoli cells which he named androblastoma.
In 1946	Friedman and Moore reviewed and classified 922 cases of tumor of the testis from the army.

*See alphabetized bibliography at end of article.

TABLE 2.—*Classification of Tumors of the Testis*

Primary

I. Germinal
   1. Pure seminoma
   2. Embryonal tumors
      (a) Embryoma
      (b) Choriocarcinoma
      (c) Embryonal carcinoma
      (d) Teratocarcinoma
      (e) Adult teratoma
   3. Combinations of 1 and 2, and of the subgroups of 2.

II. Nongerminal
   1. Interstitial cell tumors
   2. Sertoli cell tumors (androblastoma)
   3. Tumors of testicular stroma: fibroma, lipoma, hemangioma, etc.

Secondary

I. Lymphomas, plasmacytomas, leukemic and lymphocytic infiltrations, etc.

II. Carcinomatosis with involvement of testis.

TABLE 3.—*Data on 128 Cases of Tumor of the Testis*

	Cases
I. Adult patients, 121 cases	
A. Primary, 107 cases	
1. Germinal, 102 cases	
Seminoma	56
Embryomatous tumors	23
Teratocarcinoma	18
Adult teratoma	5
2. Nongerminal, 5 cases	
Interstitial cell tumors	4
Granulosa cell tumors	1
B. Secondary, 14 cases	
To carcinoma of bile ducts	1
To reticulum cell sarcoma	4
To lymphosarcoma	4
To plasmacytoma	4
To carcinoma of prostate	1
II. Children, 7 cases	
A. Primary, 3 cases	
1. Germinal 1 case	
Embryonal carcinoma	1
2. Nongerminal 2 cases	
Interstitial cell carcinoma	1
Lymphosarcoma	1
B. Secondary, 4 cases	
To the lymphomas	2
To sympathicoblastoma	1
To retinoblastoma	1

cells); tumors that arise from them are "germinal tumors," and (b) interstitial cells, Sertoli cells and cells that line the rete testis; tumors that develop from these cells and from the testicular stroma are the "nongerminal tumors."

2. That the family of "germinal" tumors is composed of two subgroups because of difference in response of the original germ cells to some unknown carcinogenic agent(s). The response varies as follows:

a. When the germ cells are stimulated to divide and multiply *without disturbing*

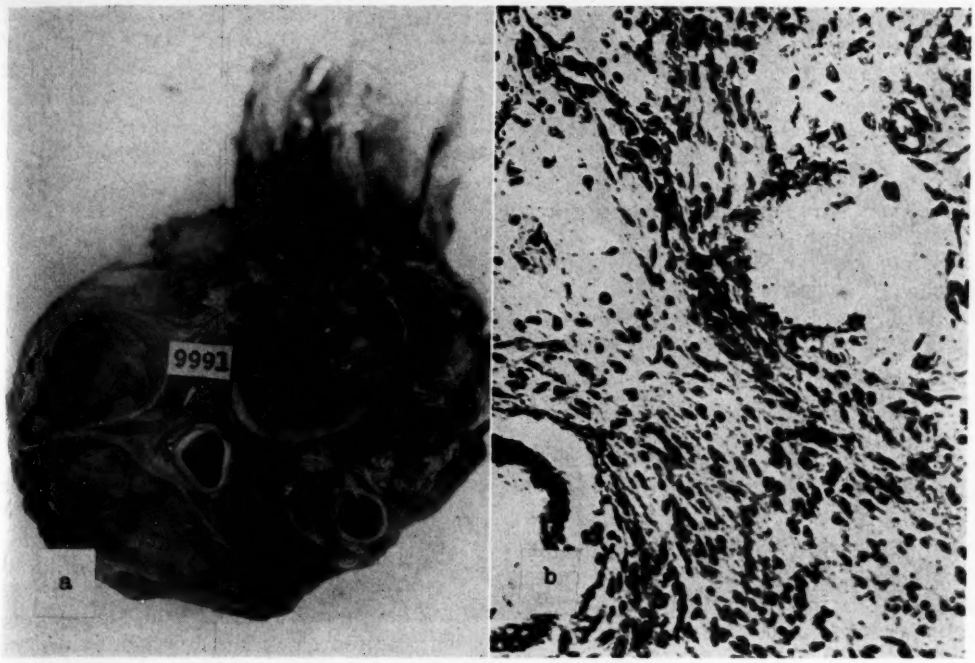

Fig. 3.—Teratocarcinoma (*a*). Note cystic areas. Microscopic sections (*b*), showing partial differentiation.

the trigerminal potential that is locked within their nuclei, the resultant tumor is a uniform mass of cells known as *seminoma* (Fig. 1).

b. When the carcinogenic agent(s) or factor(s) not only stimulates the cells to divide but at the same time forces them to *release* the trigerminal potential inherent in their nuclei—this without benefit of union with an oöcyte—a chain of events is set in motion that simulates the development of an embryo. The resultant masses comprise the *embryonal tumors.* In normal pregnancy the fertilized ovum rapidly divides to form a blastula with an inner cell mass and an outer ring from which chorionic cells differentiate. The counterpart for this stage is seen in the embryonal tumors. On rare occasions one encounters a growth that contains blastulas (*embryoma*, Fig. 2). This is usually accompanied by chorionic tissue (choriocarcinoma). In normal pregnancy the blastula quickly breaks into three germ layers: ectoderm, mesoderm and endoderm. The blastulas in the testis, too, are split into such layers but compression by surrounding tissue and the "unnatural" environment produce a hodgepodge distortion of the primary layers, with one layer, usually endoderm, outgrowing the rest (*embryonal carcinoma* or adenocarcinoma). In normal pregnancy the three germ layers now tend to differentiate into tissues, organs and systems. Should an aberration occur at this stage, a teratoid monster may form. One may surmise, on the basis of the postulate, that similar attempts at differentiation into tissue elements within the distorted primitive layers of a germinal tumor result in the formation of a teratocarcinoma (Fig. 3).

TABLE 4.—*Differentiation*

1. Somatic tumors and seminoma	start as differentiated tumors and tend to become undifferentiated.
2. Embryonal tissue and embryonal carcinoma of testis	start as undifferentiated cells and tend to become differentiated.

Complete differentiation into organs and systems characterizes the normal fetus at term. In an *adult teratoma* of the testis there is likewise differentiation of the distorted mass into adult tissue and organoid elements (Fig. 4). Growth of a testicular tumor, viewed in the light of the postulate, may be looked upon as a moving picture process, which, however, may be "frozen" at any stage. Metastasis can occur at any level and the process continued in the metastasis, so that the histologic picture may differ from that of the primary focus. Extremes in the groups of germinal tumors are rare: embryomas, because they are unstable and quickly form embryonal carcinomas; and adult teratomas, because in most cases metastases, either in the embryonal carcinoma or the teratocarcinoma stage, destroy the patient before local differentiation has occurred. Choriocarcinomas, too, are infrequent. They tend to invade blood vessels and on occasion, by producing a local infarct and scar, may leave no local trace in the testis. Yet their metastases can grow luxuriantly and destroy the host. Embryonal carcinomas and teratocarcinomas constitute the major portion of the second group of germinal testicular tumors.

TABLE 5.—*Metastases from Germinal Tumors of Testis*

Tumor	*Metastasis*
Pure seminoma	Usually as seminoma*
Embryoma	Usually as embryonal carcinoma; embryoid bodies; chorionic elements
Choriocarcinoma**	Usually choriocarcinoma: embryoid bodies; embryonal carcinoma
Embryonal carcinoma	Usually as embryonal carcinoma, teratoid elements
Teratocarcinoma	Usually as embryonal carcinoma teratoid elements
Adult teratoma	Benign, does not metastasize†

*Rarely, a component of embryonal carcinoma may be present in the original tumor. It may be missed and may appear in the metastasis as an embryonal carcinoma or teratocarcinoma or even as an area of differentiated tissue.

**Rarely, a choriocarcinoma may invade a blood vessel, cause an infarct and end up locally as a scar. Distantly, in the metastasis, it may continue to grow luxuriantly.

†If a metastasis is present then the primary tumor probably contained an area of malignancy which was probably missed.

The line of cleavage between subgroups of germinal tumors is not sharp; one may observe chorionic cells in embryonal carcinomas and in teratocarcinomas, and at times the embryonal carcinoma elements in a teratocarcinoma are so numerous that, unless block sections are made, the partly differentiated teratoid portion may be missed. It is to be expected that embryonal carcinomas will show a marked variation in their histologic pattern. One germinal layer may predominate in a particular case and another layer in a succeeding case. Local factors may oppose or stimulate differentiation and may account for the formation of a nodule of embryonal carcinoma in one area of a tumor of the testis, with a nodule of more differentiated tissue, namely, teratocarcinoma or adult teratoma, in another area.

Seminoma. — In this series seminoma was usually painless, hard, smooth, heavy, homogeneous in consistency and pinkish on section. Greyish areas of necrosis, sometimes resembling caseation, were present, as were occasionally small foci of hemorrhage. The microscopic sections revealed masses of large, usually oval cells with prominent nuclei. Branching connective tissue trabeculae divided the masses of cells into compartments. A

Fig. 4.—Adult teratoma: Note (*a*) cartilage; (*b*) adult mucosa.

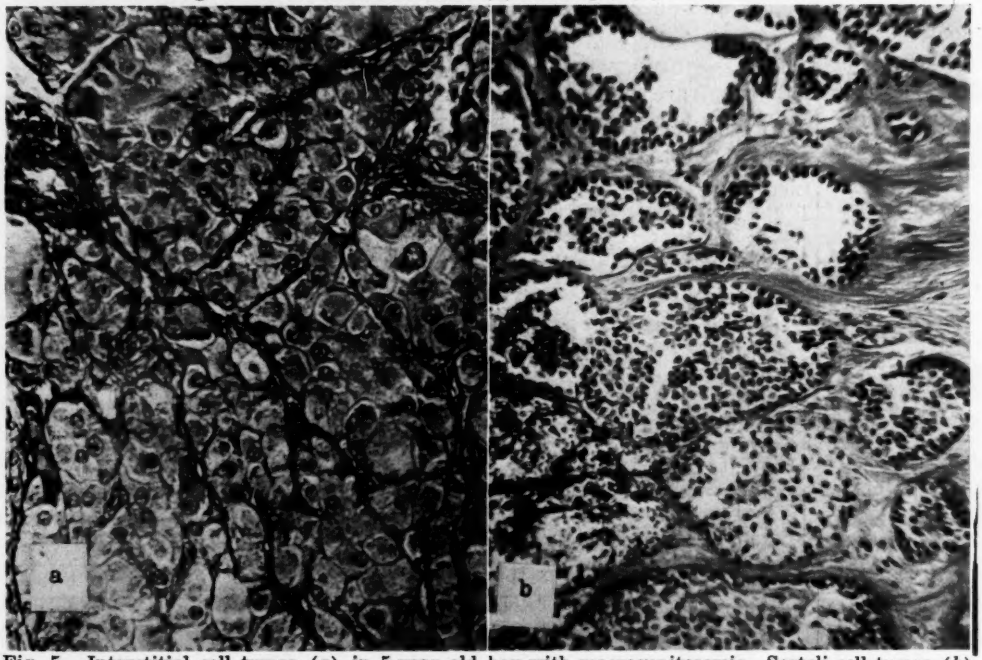

Fig. 5.—Interstitial cell tumor (*a*) in 5-year old boy with macrogenitosomia. Sertoli cell tumor (*b*) in a 52-year-old man; the androblastoma of Telium.

lymphoid stroma of variable intensity was often present. The neighboring testicular tissue was compressed, and the tubules were usually atrophic. Anaplasia was accompanied by variation in cellular and nuclear size and shape, an increase in mitoses and a decrease in stromal elements and lymphocytes (Fig. 1).

Seminomas behaved in a manner similar to cancer of other organs of the body (somatic tumors). Both seminomas and somatic tumors began as well-differentiated neoplasms and in their life cycle tended to become undifferentiated or anaplastic (Table 4). Seminomas tended to metastasize via the lymphatics, usually to the retroperitoneal lymph glands and the lungs. They were *highly radiosensitive tumors* and responded well to operation and/or radiotherapy. The improvement in results is noteworthy. The salvage rate in this disease has risen considerably (80 to 90 per cent), mainly because of early diagnosis and prompt and adequate treatment.

Embryonal Tumors. — Embryonal carcinomas included the rare embryoma, choriocarcinoma and a large group of tumors of varied microscopic pattern. All these neoplasms were uniformly aggressive, almost all displayed a predilection for vascular invasion and resistance to radiotherapy. Some of the patients complained of a painful scrotal swelling which was irregularly hard and at times tender. On section the tumors appeared as pinkish masses lined with jagged, greyish, moth-eaten borders. They frequently contained scattered crimson pools of fresh hemorrhage. Unlike seminomas which behaved like somatic growths, the component cells of embryonal tumors behaved like the early blastomers of an embryo. The cells started out as anaplastic primitive embryonal cells, and tended toward differentiation; i.e., embryonal carcinoma — teratocarcinoma — adult teratoma (Table 4).

The type of embryonal tissue that developed after release of the trigerminal potential was probably governed by general and local, biologic, chemical (endocrine?), physical and other unknown factors. The latter probably varied in every case. It was not surprising, therefore, to

TABLE 6.—*Survival Rate Among Patients With Germinal Tumors*

Tumor	*Type of Operation*	*No. Cases Followed*	*Survival 2 Yr.*	*Survival 5 Yr.*
Seminoma	Simple orchiectomy	33	20/27	18/29
	Radical orchiectomy	14	11/11	7/8
	Abdominal orchiectomy	2	2/2	2/2
Embryoma	Simple orchiectomy	1	0	0
Choriocarcinoma	Simple orchiectomy	2	0	0
Embryonal carcinoma	Simple orchiectomy	11	6/10	5/10
	Radical orchiectomy	7	3/6	2/5
Teratocarcinoma	Simple orchiectomy	14	3/7	3/7
	Radical orchiectomy	2*	.....*	.....
Adult teratoma	Simple orchiectomy	3	3/3	3/3
	Radical orchiectomy	2	2/2	.....

*Less than 2 years.

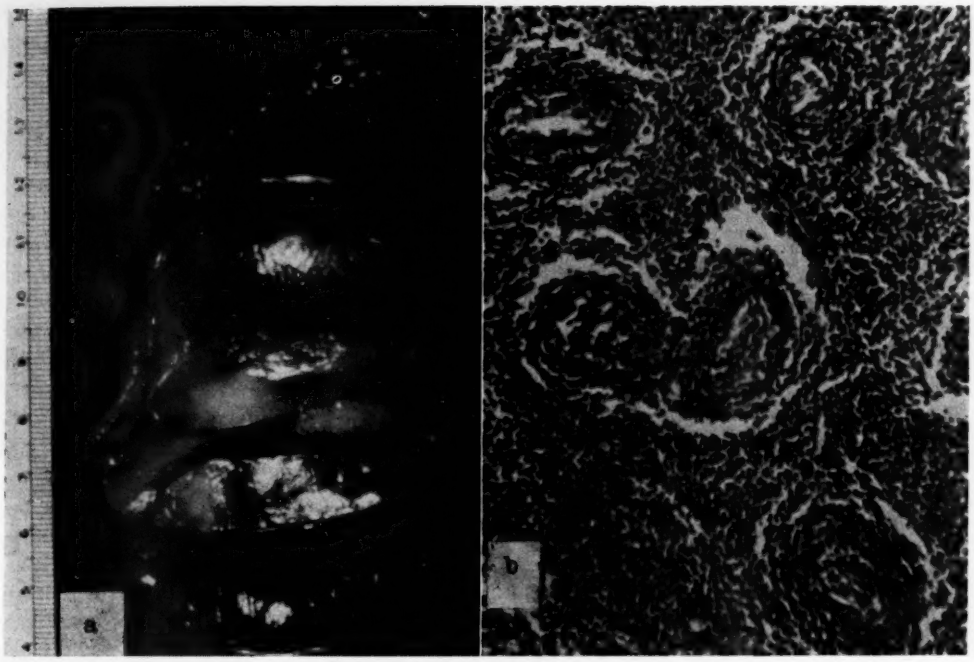

Fig. 6.—Plasmacytoma (*a*) invading testis; gross specimen. Lymphosarcoma (*b*) invading testis; microscopic section. Note infiltration of neoplastic cells between tubules.

have encountered few embryonal carcinomas that presented identical microscopic patterns. *Variation* was the essential characteristic of this tumor. On rare occasions the sections showed blastula-like structures (embryoma) lying in a wild stroma containing foci of chorionic tissue and hemorrhage (Fig. 2). Usually the hodgepodge of embryonal tissue showed a preponderance of tissue elements that were interpreted as endodermal in origin. Papillary formations and pseudoglandular structures were present (embryonal adenocarcinoma). Intertwining infolded layers of fairly large cells, supported by a vague mesenchymal stroma, were frequently seen. At times the tumors were made up of small cells in clusters surrounding small spaces. This pattern has been labeled mesodermal carcinoma. Tumors with myxomatous components also occurred. There were 3 embryonal tumors associated with masses of large cells that closely resembled seminoma. Finding foci of seminoma cells in an embryomatous tumor was not surprising, since not all germ cells need necessarily release their trigerminal potential in response to the carcinogenic agent(s) or factor(s). There were several embryonal carcinomas with cell patterns superficially resembling seminoma, but close examination revealed a solid array of large cells almost devoid of connective tissue trabeculae and lymphocytes. Block sections eventually exposed foci of papillary and pseudoglandule formation. A few of the tumors showed a sprinkling of tissue that had undergone slight differentiation along the lines of a teratocarcinoma. The merging of embryonal carcinoma with teratocarcinoma can be explained on the basis of the moving picture process as expressed in the postulate. The line of demarcation between

embryonal carcinoma and neighboring testicular tissue was not a sharp one. Infiltration between tubules and into the lumen of tubules was often seen. Masses of large, elongated, deep staining cells in the syncytium were characteristic of chorionic tissue, but occasional solitary hyperchromatic giant cells were also present. Smudgy, curvaceous signet ring cells lying in close proximity to paler cells, which have been called appliqué cells, were also encountered. These are looked upon by many as a form of chorionic cell.

Mortality rates were highest for embryoma and choriocarcinoma (100 per cent) and relatively high for embryonal carcinomas (50 to 60 per cent). The end results of teratocarcinoma were no better. This was not surprising, since "no cancer is better than its worst part" and in teratocarcinoma I was dealing with a tumor that was partly differentiated and partly undifferentiated. These tumors were often honeycombed with cysts and interpolated with greyish glistening areas of cartilage. Lying in a field of wildly growing tissue were foci of immature cartilage and glands. There were no deaths in the five-year follow-up of 3 cases of adult teratoma. The adult teratomas contained bone, cartilage, sebaceous glands, cystic structures, old blood, etc. (Table 6).

The age incidence for seminoma showed a peak in the group from 30 to 40, more than half of the tumors having occurred during that decade. The youngest patient was 21 years old; the oldest, 74. The age incidence for embryonal carcinoma was greatest between the ages of 20 and 35, and there were 3 patients under 20.

In the series of 100 cases of primary testicular tumors there were 2 (seminomas) that developed in abdominal testes (L. S. and P. C., aged 47 and 40 respectively; 1 in an ectopic testis (retrovesical), and 2 seminomas that developed in undescended testes on which orchiopexy had previously been performed. These occurred in patients N. S. and C. Q., aged 36 and 37 years respectively, on whom orchiopexy had been performed at the respective ages of 14 and 15 years, and each returned twenty-two years later with a tumor on the operatively treated side. Considerable evidence has been accumulated which suggests that seminoma tends to develop in atrophic testes. *Biopsy* of the gonad should *precede* orchiopexy. If atrophy or germinal aplasia is present, orchiectomy should be performed. The optimum age for orchiopexy is between 5 and 7 years (Robinson and Engle).

Seminoma vs. Lymphosarcoma: There were 4 patients, all over 50, in whom an erroneous diagnosis of seminoma was made either on biopsy, on the basis of the operative specimen, or at autopsy. All had lymphomatous tumors. An anaplastic seminoma and a bizarre lymphoma may be confused for one another, particularly when the *presenting* symptom is a scrotal mass. It is important to call attention to this possible error, since the prognosis of the two diseases is different, being fairly good for seminoma and ultimately hopeless for lymphosarcoma.

Seminoma and other primary tumors of the testis usually expanded and compressed neighboring testicular tissue, and thus a line of demarcation tended to form. In secondary tumors, particularly the lymphomas, the neoplastic cells flowed like lava between tubules isolating them as islands in a sea of neoplastic cells (Fig. 6).

Nongerminal and Secondary Tumors: Nongerminal tumors were rare. A benign interstitial cell tumor of the right testis was removed from a 5-year-old boy with macrogenitosomia. The component cells were typical of the Leydig cell variety but contained no Reinke crystals (Fig. 5). Only slight recession in the precocious sex development was noted in the two-year follow-up. The interstitial cell tumors in

adults (4 cases) were observed incidentally. Gynecomastia was not present in this series.

Sertoli cell tumors are rare, and only 1 case, reviewed and accepted by Teilum, was included in my series (Fig. 5). The tumor, a very large one, was removed from a 53-year-old man. The cells resembled the granulosa cells of the homologous tumor of the ovary. Call-Exner bodies were seen. A review of the patient's chart revealed no recorded evidence of feminization.

Secondary tumors of the testis were rare and were part of a general malignant disease, such as lymphosarcoma, plasmacytoma, leukemia, and the end stages of generalized carcinomatosis. The important aspect was recognition of the fact that the testis was involved secondarily and was not the seat of a primary growth.

SUMMARY

1. A classification of tumors of the testis based on two postulates has been presented:

Postulate 1. That all primary tumors of the testis originated from testicular components. Those that arose from spermatogones (germ cells) were designated as *germinal* tumors (95 per cent), and those that developed from Sertoli cells, Leydig cells, stroma, etc., as nongerminal tumors (5 per cent).

Postulate 2. That the family of germinal tumors was divided into two branches, depending on the type of response of the spermatogone nucleus to the carcinogenic agent(s) or factor(s):

a. If the agent(s) or factor(s) merely caused the nucleus to divide without releasing its intranuclear potential, a tumor composed of a uniform array of cells formed. This was the seminoma or dysgerminoma.

b. If the agent(s) or factor(s) caused release of the intranuclear trigerminal potential, a series of events was set in motion simulating those in pregnancy. Thus embryoid bodies or blastulas were formed (embryomas), with or without chorionic tissue (choriocarcinoma), followed by a cleavage into three distorted germ layers (embryonal carcinoma), followed by partial differentiation (teratocarcinoma), and ending as a well differentiated mass (teratoma). The process was thought to be a "moving picture" one and could be "frozen" at any stage. Embryoma and choriocarcinoma were rare and unstable; embryonal carcinoma and teratocarcinoma were more common, and adult teratoma was also rare: embryonal carcinoma and teratocarcinoma tended to metastasize before there was opportunity for further differentiation.

2. Seminoma tended to metastasize via lymphatics and was radiosensitive. A five-year cure was obtained in over 80 per cent of cases. The great improvement in results has been due to early diagnoses, prompt and adequate surgical measures and radiotherapy.

3. Embryoma and choriocarcinoma were highly malignant, and no cures of these tumors were obtained in this series.

4. Embryonal carcinoma and teratocarcinoma tended to be radioresistant. An improvement in the cure rate was noted but the five-year cure rate ranged between 40 and 60 per cent.

5. Seminoma tended to occur in atrophic testes. Two patients on whom orchipexy was performed at the ages of 14 and 15 returned twenty-two years later with seminoma. Orchiopexy should be performed early, at the age of 4 to 5.

SUMARIO

1. É apresentada uma classificação dos tumores do testiculo, baseada em dois postulados:

Postulado I: Todos os tumores primarios do testiculo se originam dos compo-

sentes testiculares. Os que provieram dos espermatogonios (celulas germinativas) foram designados por *tumores germinais* (95 por cento), ao passo que aqueles que provieram das celulas de Sertoli, celulas de Leydig, estroma, etc., por *tumores não germinais* (5 per cento).

Postulado II: A familia dos tumores germinais foi dividida em dois ramos, conforme o tipo de resposta do nucleo espermatogonio ao agente(s) ou fator-(es) carcinogenico:

a.) Se o agente(s) ou faotr(es) carcinogenico apenas faz com que o nucleo se divida, sem libertar seu potencial intranuclear, resulta um tumor composto de celulas uniformes. Trata-se do seminoma ou disgerminoma.

b.) Se o agente(s) ou fator(es) fax com que haja libertação do potencial trigerminal intranuclear, desencadeia-se uma serie de fatos que simulam os da gravidez. Formam-se assim corpos embriodes ou blastulas (embriomas), com ou sem tecido corionico (coriocarcinoma), seguindo-se uma clivagem em três camadas germinativas disformes (carcinoma embrionario), seguindo-se uma diferenciação parcial (teratocarcinoma), terminando como uma massa bem diferenciada (teratoma). Teve-se a impressção de que tal processo seja movel e que pode ser surpreendido em qualquer fase. Os embriomas e coriocarcinoma são raros e instaveis; os carcinomas embrionarios e os teratocarcinoma são mais comuns e os teratomas adultos são tambem raros: os carcinomas embrionarios e os teratocarcinomas tendem a dar metastases antes que haja oportunidade para posterior diferenciação.

2. Os seminomas tendem a dar metastases por via linfatica e são radio-sensiveis. Em mais de 80 por cento dos casos foi obtida cura de cinco anos. Melhores resultados têmsido devidos ao diagnostico precoce, medidas cirurgicas prontas e adequadas e radioterapia.

3. Os embriomas e coriocarcinomas são altamente malignos e nesta serie não houve cura destes tumores.

4. Os carcinomas embrionarios e os teratocarcinomas tendem a ser radio-resistentes. Foi notada uma melhoria na taxa de cura, mas a taxa de cura de cinco anos variou entre 40 e 60 por cento.

5. Os seminomas tendem a ocorrer em testiculos atrofiados.

ZUSAMMENFASSUNG

1. Es wird eine auf zwei Grundvoraussetzungen basierte Einteilung der Hodengeschwültse vorgelegt:

Erste Grundvoraussetzung ist, dass alle vom Hodengewebe abstammenden Primärgeschwülste des Hodens, die ihren Ursprung in den Spermatogenen (Keimzellen) haben, als *Keimgeschwülste* (95 Prozent) bezeichnet wurden, und dass die von den Sertolischen Zellen, den Leydigschen Zellen, vom Stroma usw. ausgehenden Geschwülste die Benennung *Nichtgerminale Tumoren* erhielten (5 Prozent).

Zweite Grundvoraussetzung ist, dass die Familie der Keimgeschwülste entsprechend der Reaktion des Keimzellkernes auf das karzinogene Agens (s) oder auf den karzinogenen Faktor (s) in zwei Klassen eingeteilt wurde:

a. Wenn das Agens (s) oder der Faktor (s) nur eine Teilung des Kernes, ohne sein intranukleäres Potential auszulösen, hervorrief, entstand eine aus gleichmässiger Zellanordnung zusammengesetzte Geschwulst. Diese war das Seminom oder Dysgerminom.

b. Wenn das Agens (s) oder der Fak-

tor (s) zu einer Auslösung des intranukleären Keimpotentials führte, kam es zum Ablauf von Vorgängen, die den während der Schwangerschaft beobachteten Prozessen ähnelten. So entstanden embryoide Gebilde oder Keimbläschen (Embryome) mit oder ohne Chorionge-webe (Choriokarzinome) gefolgt von einer Spaltung in drei verzerrte Keimschichten (embryonale Karzinome), gefolgt von partieller Differenzierung (Terakarzinome) und schliesslich gut ausgebildete Massen (Teratome). Der Vorgang wurde mit einem kinematographischen Film, der in jedem beliebigen Augenblick zum Stillstand kommen konnte, verglichen. Embryome und Choriokarzinome waren selten und unbeständig, embryonale Karzinome und Teratokarzinome kamen häufiger vor, und ausgewachsene Teratome waren ebenfalls selten. Die embryonalen Karzinome und die Teratokarzinome neigten zur Metastasierung, bevor eine weitere Differenzierung möglich war.

2. Das Seminom neigte zur Metastasierung auf dem Lymphwege und war strahlenempfindlich. In mehr als 80 Prozent der Fälle wurde eine fünfjährige Heilung erzielt. Die bedeutende Verbesserung der Behandlungsergebnisse ist einer frühzeitigen Erkennung der Krankheit und der unverzüglichen Anwendung ausreichender chirurgischer Massnahmen und der Strahlentherapie zuzuschreiben.

3. Das Embryom und das Choriokarzinom erwiesen sich als äusserst bösartig, und in der vorliegenden Krankenserie wurden keine Heilungen dieser Geschwülste erzielt.

4. Das embryonale Karzinom und das Teratokarzinom zeigten eine Neigung zur Strahlenresistenz. Es liess sich eine Verbesserung der Heilungsquote beobachten, die fünfjährigen Heilungen wurden aber nur in 40 bis 60 Prozent der Fälle erzielt.

5. Das Seminom trat mit Vorliebe in atrophischen Hoden auf.

RÉSUMÉ

1. On a presenté une classification des tumeurs du testicule qui est basée sur deux conclusions.

Demande 1: Que touts les tumeurs primaires du testicule, qui ont leur origine dans les éléments testiculaires, développés de spermatogènes (cellules germinales) soient classifiés comme *tumeurs germinaux* (95%) et ceux qui se développent des cellules de Sertoli et Leydig, du stroma etc. soient nommés *non germinaux* (5%).

Demande 2: Que la famille des tumeurs germinaux soit dividée en 2 branches, dépendant du type de réponse du nucleus spermatogonus a l'agent ou facteur carcinogénique.

a. Si l'agent ou facteur cause seulement la division du nucleus, sans mettre en action son potentiel intranucléaire, un tumeur d'arrangement uniforme des cellules est formé. C'est ce qu'on apelle séminome ou dysgerminome.

b. Si l'agent ou facteur cause la mise en action du potentiel intranuclaire, trigerminal, une série d'évènements se produit, qui ressemble a ceux pendant la gravidité. Ainsi des corps embryoides ou blastulae sont formés (embrryomes) avec ou sans tissu chorionique (choriocarcinome), suivi par une séparation en 3 couches germinales desordonnées (carcinome embryonale) suivi d'une Distinction partiale (teratocarcinoma) et terminant en un tumeur bien différencié (teratoma).

La procédure a l'air d'un film cinématographique qui peut être arreté a toute epoche. Embryoma et choriocarcinoma étaient rares et pas stabiles. Carcinoma embryonale et teratocarcinoma furent observés plus souvent et teratoma adulte fur aussi observé rarément; carcinoma embryonale et teratocarcinoma formaient

souvent des metastases, avant qu'il eut l'occasion d'une différentiation plus exacte.

2. La séminoma avait la tendance de former des metastases via les lymphatiques et était radiosensitive. Une cure de 5 ans fut obtenue a plus que 80% des malades. Des résultats beaucoup meilleurs furent obtenus par une diagnose precoce, des mesures chirurgicales promptes et suffisantes et radiothérapeutique.

3. Embryoma et choriocarcinoma étaient fort malignes et pas une cure de ces tumeurs fut obtenue.

4. Carcinoma embryonale et teratocarcinoma paraissaient radiorésistants. Une plus grande proportion de guérisons fur observée, mais seulement 40 a 60% de ces cas étaient guéris après 5 ans.

5. Séminoma avait la tendance de se développer dans des testicules atrophiques.

RIASSUNTO

1. Viene formulata una classificazione dei tumori del testicolo basata su due conclusioni:

—Che tutti i tumori primitivi del testicolo originati da strutture testicolari di origine spermatica (cellule germinali) vengono indicati come tumori "germinali" (95%), mentre quelli originati da altri elementi come le cellule di Leydig, le cellule di Sertoli, lo stroma etc., vengono indicati come tumori "non germinali."

—Che il gruppo dei tumori "germinali" comprende due sottogruppi a seconda del tipo di risposta del nucleo dello spermatogonio agli agenti o ai fattori carcinogenetici:

a) Se questi determinano sopratutto una divisione nucleare senza liberazione del potenziale intranucleare, allora si forma un tumore composto da un tipo uniforme di cellule, come nel caso del seminoma o disgerminoma;

b) Se invece provocano la liberazione del potenziale trigerminale intranucleare, allora si determina una serie di fenomeni che somigliano a quelli della gravidanza. Si formano, così, dei corpi embrioidi o delle blastule (embriomi), con o senza tessuto corionico (coriocarcinomi) seguiti dalla divisione in tre strati irregolari (carcinoma embrionario) e quindi da una parziale differenziazione (teratocarcinoma) e infine in un tumore ben differenziato (teratoma). Questo processo può arrestarsi a qualunque stadio. Gli embriomi e i coriocarcinomi sono rari e instabili; il carcinoma embrionario e il teratocarcinoma sono più frequenti; il teratoma dell'adulto è raro; il teratocarcinoma e il carcinoma embrionario tendono a dare metastasi precocemente.

2. Il seminoma metastatizza per via l'infatica ed è radiosensibile. Nell'80% dei casi si è ottenuta una guarigione di 5 anni. Questo successo terapeutico è dovuto alla diagnosi precoce, alla tempestività della cura chirurgica e alla radioterapia.

3. L'embrioma e il coriocarcinoma sono molto maligni e non si è mai potuta ottenere una guarigione.

4. Il carcinoma embrionario e il teratocarcinoma sono piuttosto radioresistenti. Si è ottenuto un miglioramento nella prognosi ma la percentuale di successi dopo 5 anni varia fra il 40 e il 60%.

5. Il seminoma compare di preferenza nei testicoli atrifici.

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Our teachers allow students to choose their own studies, not in order to appeal to intellectual or to professional interest, but because they themselves have no choice of their own in which they believe with sufficient intensity to impose it upon their pupils.

The old classical curriculum was founded by men who had a theory of the world and of human life. They had taken all the available content of human knowledge and had wrought it together into a coherent whole. What they knew was, as judged by our standards, very little in amount. But upon that little content they had expended all the infinite pains of understanding and interpretation. They had taken the separate judgments of science, philosophy, history, and the arts, and had so welded them together, so established their relationships with one another, so freed them from contradictions and ambiguities that, so far as might be in their day and generation, human life as a whole and the world about us were known, were understood, were rationalized. They had a knowledge of human experience by which they could live and which they could teach to others engaged in the activities of living.

—Meiklejohn

Treatment of Certain Types of Chorea, Athetosis and Tremor by Stereoencephalotomy

H. T. WYCIS, M.D., F.A.C.S., D.A.B. AND E. A. SPIEGEL, M.D., D.A.B.

PHILADELPHIA, PENNSYLVANIA

SOME years ago we had an opportunity to review in this *Journal*,[1] some applications of stereoencephalotomy. This method permits one to produce small circumscribed lesions in subcortical areas by electrolysis or electrocoagulation, with minimal injury to overlying cerebral structures. The lesions are made by inserting thin electrodes in the exact direction desired and to the predetermined depth by means of a guiding apparatus called the stereoencephalotome.[2] The previous applications (thalamotomy for emotional disorders and mesencephalotomy for various types of "intractable" pain) have been extended to the diseases of the so-called extrapyramidal system, particularly the involuntary movements associated with chorea and athetosis and the resting tremor characteristic of paralysis agitans and Parkinsonism. Data collected from experiences with these conditions are here briefly summarized.

Before producing lesions in these cases, it seemed desirable to ascertain the functional state of the basal ganglia, chiefly the globus pallidus and the caudate nucleus, by depth electrographic study, and also to evaluate the effect of temporary paralysis, e.g., of the globus pallidus, especially in the presence of involuntary movements, by injection of local anesthetics.

For this purpose a new type of stereoencephalotome was constructed (Fig. 1). It permits one to apply the apparatus repeatedly in exactly the same position. The apparatus is fixed to the skull by means of four hollow screws, into which are threaded four small steel balls on which the feet of the stereoencephalotome may be fixed in any position. The length of these feet can be varied; at their upper ends they are connected to the basal ring by universal joints, so that the base can be easily placed in a position parallel to the plane determined by the Frankfurt horizontal lines. Within the basal ring a horizontal rectangular frame can be rotated and moved forward or backward. The electrode holder can be moved on the frame to left or right and can be rotated in the frontal or the sagittal direction.

In some types, at least, of *chorea* and *athetosis* one deals with an abnormally increased activity of the pallidum. This view can be corroborated from a study of cases of Huntington's chorea, as has been reported.[3] Suffice it to mention that pallid-

From the Departments of Experimental Neurology and Neurosurgery, Temple University School of Medicine and Hospital, Philadelphia.

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otomy was performed in 4 cases of Huntington's chorea and in 1 case of chorea electrica. It was ineffective in the last-mentioned case in which there were attacks of violent jumping movements of the whole body, complicated by epileptiform seizures and cerebral dysrhythmia noticeable in the electroencephalogram. In 1 of the 4 cases of Huntington's chorea, hemiplegia developed contralateral to the pallidotomy, caused either by encroachment of the lesion upon the internal capsule or by interference with its blood supply. In a second case a decrease of the involuntary movements was obtained on one side only, despite the bilateral but punctuate pallidal lesions. In the 2 other cases the pallidal lesions resulted in definite diminution or nearly complete elimination of involuntary movements of the extremities after the first operation (right pallidotomy) on the left side and a second-stage operation (left pallidotomy) on the right side. Although a certain degree of recurrence of the involuntary movements in cases of a progressive disease like Huntington's chorea was to be expected, motion pictures taken of the patient observed over the longest period (more than four years) still showed a marked reduction of involuntary movements as compared to the preoperative status. This case is also important with regard to the question whether cessation of the involuntary movements is due to the pallidal lesions or to unintended by-effects upon corticofugal fibers of the internal capsule injured directly by the electrolysis or indirectly by thrombosis of vessels passing through the pallidum. Four years after the operation this patient was able to perform skilled movements with both hands, so that his pyramidal tracts can be regarded as practically unimpaired. It is therefore justifiable to relate the marked reduction of his involuntary movements, still noticeable at the end of this period, to the pallidal lesion.

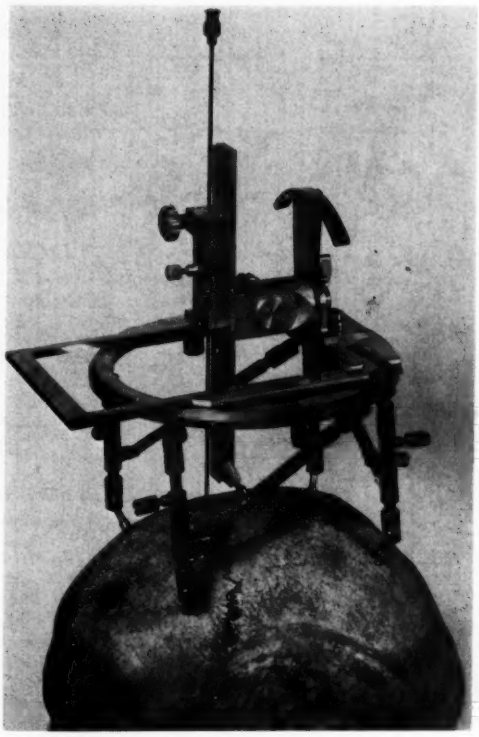

Fig. 1.—Stereoencephalotome, Model V.

Like chorea, the term *athetosis* includes involuntary movements caused by various pathogenetic mechanisms. In order to select the proper patients for treatment by lesions of the pallidum or of its efferent fibers, depth electroencephalographic study and/or production of a transitory paralysis of the pallidum by injections of procaine hydrochloride are helpful. Particularly under the influence of drugs, e.g., on awakening from barbiturate anesthesia, some of our patients with athetosis showed increased pallidal activity (Fig. 2). In a case of posthemiplegic athetosis the electric discharges of the opposite caudate nucleus were definitely reduced as compared to those of the homolateral caudate nucleus (Fig. 3). This is in agreement with the view that lesions of the striatum (caudate nucleus and putamen) induce a

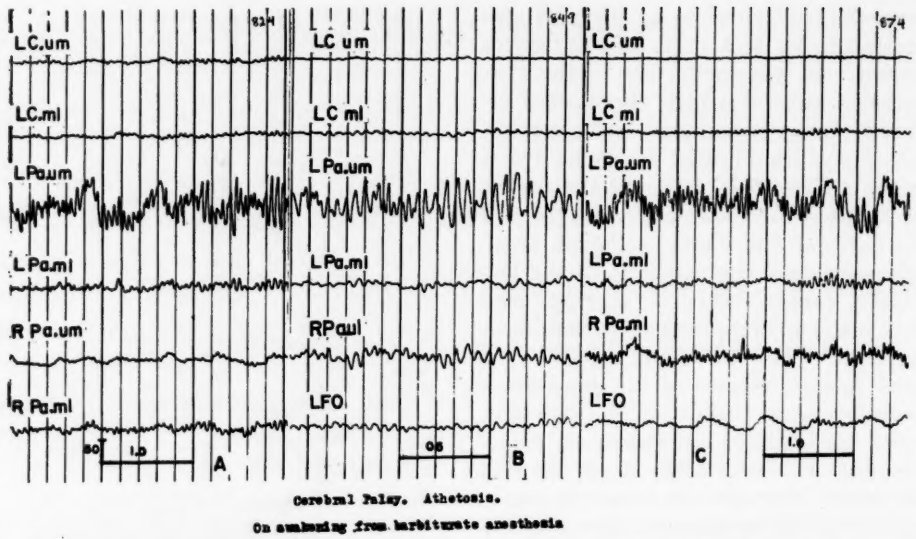

Fig. 2.—Electrogram of the basal ganglia in a case of cerebral palsy with athetosis during awakening from barbiturate anesthesia. *LC*, left caudate nucleus; *LPa*, *RPa* left and right pallidum respectively. Three electrodes are in each ganglion (*u*, upper, *m*, middle, *l*, lower electrode). *LFO*, left fronto-occipital leads. Standardization, 50 μ volts; time, 1 second in *A* and *C*, 0.5 second in *B*.

release of pallidal mechanisms that innervate certain involuntary movements ("automatisms"). Indeed, in such cases of athetosis as met the criteria of an electrographically demonstrable increased pallidal activity and/or of a beneficial effect of procaine injection into the pallidum, electrocoagulation of parts of this ganglion and of its efferent fibers (pallido-ansotomy) proved able to reduce the involuntary movements.

In addition to the innervation of some involuntary movements, the pallidum seems to emit impulses that facilitate the activity of lower reflex arcs, which maintain the *resting tremor* observed in cases of paralysis agitans and Parkinsonism. This may be inferred from observations in cases in which this type of tremor could be reduced by pallido-ansotomy. A similar effect was produced by R. Meyers, who introduced a blunt probe through the foramen of Monro into the third ventricle and incised its lateral wall in order to interrupt the fibers of the ansa lentiformis. Meyers apparently has abandoned this operation in view of its high mortality rate (20 per cent).[4] In our series of 17 cases in which lesions of the ansa were produced by a needle electrode inserted through the frontal lobe, we lost 1 patient. This patient had advanced Parkinsonism. We could not communicate with him or check his ability to perform voluntary movements during operation, because he was a deaf mute. Hemiplegia developed, and the patient died four months after the operation. This case taught us the importance of performing the ansotomy with local anesthesia, so that the effect of electrocoagulation, not only upon the tremor but upon the patient's ability to perform voluntary movements, can be continually checked. The coagulation should be immediately stopped if these movements become weaker in the contralateral extremities.

The lesions of the ansa lentiformis are made in the frontal level of the anterior

commissure, 3,6 mm. and sometimes also 9 mm. behind this level, if the lesions placed more anteriorly are insufficient to reduce or abolish the tremor.

A favorable effect, i.e., a more or less marked diminution of the tremor, was obtained in 10 of the 16 surviving patients who had been unresponsive to the usual types of medication (excellent results in 5, fair results in the other 5; duration of observation, up to three years). The favorable effects were noted particularly in patients with unilateral or predominantly unilateral involvement, while the failures (no reduction or brief temporary reduction of the tremor) were observed chiefly in patients with generalized tremor.

In about one-half of the cases there was also a favorable effect upon the *bradykinesis* that occurred independently of changes in muscle tone, so that the frequency of alternating flexor-extensor movements of the fingers was significantly increased.

In some patients the *rigor* of the extremities was definitely decreased; this we were able to demonstrate objectively by recording the resistance to passive movements by means of a myotonograph.[5] The abnormal posture of the trunk could not be influenced, nor could the gait. This decrease of muscle tonus was rather unexpected, since it is known that pallidal diseases usually induce an increase of muscle tonus. In treating these diseases of the pallidum, one deals with diffuse processes that frequently also affect other parts of the extrapyramidal system (e.g., the substantia nigra), while our operative procedures produced small circumscribed lesions of the pallidum and the ansa lentiformis. This difference suggests the hypothetical explanation that the pallidum sends to the lower tonus-maintaining reflex arcs not only inhibitory but facilitating impulses and that ansotomy probably interferes chiefly with the latter. In order to reach definite conclusions as to the mechanisms responsible for the reduction of rigor following ansotomy, further studies, particularly of histologic controls of the lesions, seem necessary.

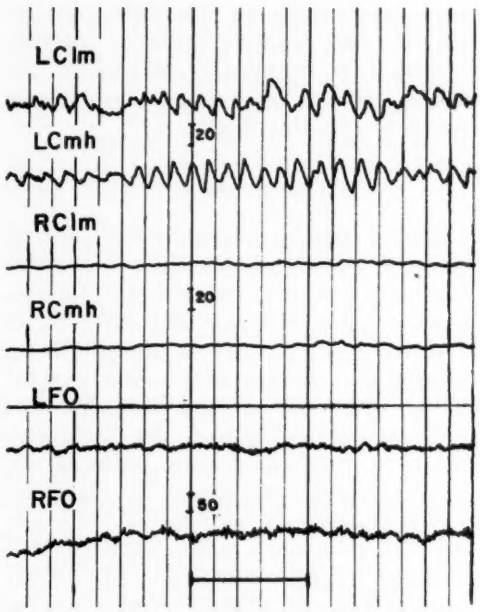

Fig. 3.—Left-sided posthemiplegic athetosis. Flat record from the right caudate nucleus (*RC*); apparently normal record from the left caudate nucleus (*LC*). Lower, middle and upper electrode, *l*, *m* and *h*. *LFO*, *RFO*, left and right frontooccipital leads.

SUMMARY

The authors discuss the use of stereoencephalotomy in the treatment of certain types of chorea, athetosis and tremor. Small circumscribed lesions are produced in subcortical areas by electrolysis or electrocoagulation, with the aid of a guiding apparatus, the stereoencephalotome. The effects on involuntary movements and on the "resting tremor" associated with paralysis agitans and Parkinson's disease, are described. A favorable effect, i.e., a more or less marked diminution of tremor, was obtained in 10 of 16 patients who had

been unresponsive to the usual medication. In the authors' opinion, further studies, with histologic controls of the lesions, will be necessary before definite conclusions can be drawn.

ZUSAMMENFASSUNG

Die Verfasser erörtern die Verwendung der Stereoenzephalotomie in der Behandlung gewisser Formen von Chorea, Athetose und Zittern. Mit Hilfe eines lokalisierenden Apparates, des Stereoenzephalotoms, werden kleine umschriebene Zerstörungsherde in subkortikalen Gebieten durch Elektrolyse oder Elektrokoagulation geschaffen. Die Wirkung auf unwillkürliche Bewegungen und auf den mit der Paralysis agitans und Parkinsonscher Krankheit einhergehenden "Ruhetremor" wird beschrieben. Ein günstiger Einfluss, d.h. eine mehr oder weniger ausgesprochene Herabsetzung des Zitterns, wurde an zehn der sechszehn Patienten, die auf die üblichen Medikationen nicht ansprachen, erzielt. Die Verfasser glauben, dass, ehe endgültige Schlussfolgerungen gezogen werden können, weitere Untersuchungen mit histologischer Kontroll der erzeugten Herde notwendig sind.

RÉSUMÉ

Les auteurs discutent l'application de la stéréoencephalotomie dans le traitement de certains types de choréa, athétose et tremeur. Des petites lesions limitées sont crées dans les zones subcorticales par électrolyse ou coagulation guidé par un appareil, nommé le stéréo-encephalotome. l'effet au mouvements involontaires et au "tremeur de repos" associés à la paralysis agitans et à la maladie de Parkinson est décrit. Un effet favorable, c'est à dire une diminution du trémeur plus ou moins remarquable, fut obtenu chez 10 malades, qui survivaient et qui n'avaient pas répondu à des autres sortes de médication. Dans l'opinion de l'auteur il faudra faire plus d'études avec des contrôles histologiques des lésions, avant de pouvoir faire des conclusions défines.

RESUMEN

Los autores discuten el uso de la estereoencefalotomía en el tratamiento de ciertos tipos de corea, atetosis y temblor. Por medio de electrolisis y electrocoagulación se producen pequeñas lesiones circunscritas en áreas subcorticales, con la ayuda de un aparato, el estereoencefalotomo. Se describen los efectos sobre los movimientos voluntarios así como sobre el temblor de reposo que se presenta en la enfermedad de Parkinson y en la parálisis agitante. En 10 de los pacientes que sobrevivieron y que no habían respondido a la terapeútica habitual se obtuvo un efecto satisfactorio consistente en una disminución marcada del temblor. En la opinión del autor se necesitan controles histológicos de las lesiones antes de llegarse a conclusiones más definidas.

SUMARIO

Os autores discutem o emprêgo da estereoencefalotomia no tratamento de certas formas de coréia, atetose e tremor. Pequenas lesões circumscritas são produzidas em áreas subcorticais pela eletrólise ou electrocoagulação, com o auxílio de um aparêlho, o estereoencefalotomo. O efeito sôbre os movimentos involuntários e sôbre o "tremor de repouso" associado com paralisia agitante e a doença de Parkinson são descritos. Um efeito favorável, i.e., uma maior ou menor diminuição na intensidade do tremor, foi obtido em 10 dos pacientes sobreviventes que não tinham reagido à medicação usual. Na opinião do autor, antes de se estabelecerem conclusões definitivas, devem ser realizados estudos posteriores com um controle histológico das lesões.

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The guiding circumstance of a surgeon's life is personal responsibility. He is in charge, he must make decisions and initiate or carry out the line of action those decisions imply, and on the correctness of his decisions and the skill and determination with which the action is carried out depends the welfare and possibly the life of his patient. All the material for a correct diagnosis may not be available, at any rate at a particular time, but there must always be a decision; even though it may not be the right one it is the best that can be made at the time and the one on which action must be based if action is needed.

A surgeon conducting a difficult case is like the skipper of an ocean-going racing yacht. He knows the port he must make, but he cannot foresee the course of the journey. He must be guided as he goes by changes of wind and weather, he must constantly seek help from the barometer, the lead, the look of the sky, the B.B.C. weather forecast, and he must plan his course not so much as to give the most direct journey as at all stages to avoid possible dangers. At every point he must know how far he has travelled, where he is, and the limits of error within which his projected position may lie; what dangers and difficulties lie immediately ahead; and how soon he may expect to make port. At every stage he must have a plan, based on a working knowledge of his present position, that will allow him to make for the best of several available harbors should things go wrong, or if none is suitable he must know where to find temporary refuge under the lee of the land till he can resume his journey.

—Ogilvie

Extreme Hernia Uteri Gravidi Abdominalis

Report of a Case

KURT KAISER, M.D., A.I.C.S.

GLOVERSVILLE, NEW YORK

MOST malpositions or malpresentations are caused by disproportion between the fetus and the maternal pelvis or by tumors hindering the engagement of the presenting part. Deformities of the uterus, like all degrees of uterus duplex, may be responsible for breech, oblique or transverse presentations. Displacement of the uterus too may create obstetric problems. The retroflexed uterus, if it does not correct itself automatically or is not corrected, generally leads to incarceration behind the promontory and to abortion. The hyperanteflexed uterus has no chance to become incarcerated but may lead to malposition and dystocia, especially in extreme cases like the one here presented.

REPORT OF CASE

A white woman aged 37 was seen for the first time at 9 a.m. on Oct. 10, 1952, in the labor room in consultation. Her last menstruation had occurred on February 1.

The estimated date of delivery was August 11. She had been in hard labor for over twelve hours. Menstruation had started when she was 12 years of age and had been regular and normal, occurring every four weeks and lasting about six days, without pain. She had borne six children between 1939 and 1949, all normal deliveries, the first with a breech presentation. Labor had ranged from four to fourteen hours. All children were born alive and the birth weight of all was between 8 and 10½ pounds (3,629 and 4,863 Gm.). During this pregnancy the patient saw her physician only once, and she was not examined before admission. When seen lying in bed she presented a most unusual sight; the abdomen was protruding forward in an almost acute angle. When she was in an erect position the fundus of the uterus fell forward and downward, reaching the middle of the thighs. She was obese, weighing approximately 250 pounds (123.4 Kg.), with an enormous anasarca including the abdominal wall. Besides the anasarca she had a large apron of fat that made external examination very difficult, especially as the whole abdomen was extremely tender. Nevertheless a large hard fetal part was palpated in the middle of the enormous bulge of the uterus. No other fetal parts could be felt by the examining hand. A quick rectal examination proved the pelvis entirely empty, with no presenting part. The impression was that the baby stood upright on the mother's spine when she was lying in bed. This description is incorrect but best illustrates the situation. Roentgen examination verified this most unusual position. Unfortunately the roentgenograms, because of poor contrast, are not fit for reproduction. The roentgenologist described the situation correctly, referring to the mother in the erect position: "The fetus is lying horizontally, with its pelvis posterior in relation to the mother and the head extending directly forward to the anterior abdominal wall."

The patient's blood pressure in millimeters of mercury was 152 systolic and 94 diastolic. There was no albumin in the urine. The fetal heart tones were heard in the right upper

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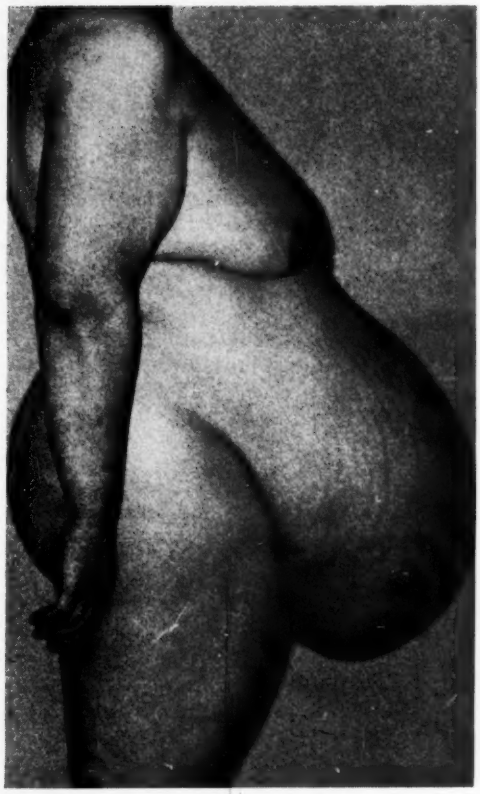
quadrant, regular but very faint. The patient was quickly given 500 cc. of 20 per cent dextrose intravenously and 2 cc. of 50 per cent magnesium sulfate intramuscularly. At 10:30 a.m. a vaginal examination was done. The pelvis was entirely empty; no presenting part was palpated. The cervix was almost entirely open but looked toward the mother's promontory. The membranes were intact. The cervix could easily be fully dilated. I therefore ruptured the membranes, grasped both legs of the child at the region above the mother's sacrum and with version-like manipulation extracted the baby by the feet. This procedure, especially the delivery of the shoulders, was a little difficult on account of the size of the baby, which weighed 11 pounds (4,089 Gm.). The baby cried well after the delivery, but in spite of pediatric attention died after twelve hours, with symptoms of atelectasis. The pediatrician called it a "premature giant child," damaged by the mother's untreated preeclampsia. The mother's recovery was uneventful. The blood pressure returned to normal, the edema subsided quickly, and she was discharged on the sixth day, October 15.

The patient was not seen again until April 29, 1955, when she came to the office in the seventh month of pregnancy. She was then 40 years old and expecting her eighth child. The most recent menstruation had occurred on Oct. 2, 1954. She presented again the same peculiar and spectacular appearance as before. The acutely angled bulge of the abdomen containing the fundus of the uterus again dropped forward and downward when she stood erect. Again there was enormous edema of the legs and abdomen. She weighed 245 pounds. (111.1 Kg.). The blood pressure at the first office examination was 200 systolic and 110 diastolic. There was a 2 plus reaction for albumin, and the value for chlorides was 534 mg. The urea content and the blood count were normal. With strict diet and rest the patient, who was very cooperative, lost some weight at home, but on May 10 she had to be hospitalized. After treatment with strict bed rest, hypertonic dextrose, magnesium sulfate and sedation, the dangerous toxemia improved so much that after a short time she was able to go home. During her stay in the hospital the photograph presented here was taken showing her already in a much improved condition. Roentgen studies were made, and this time the reverse position of the fetus was diagnosed. The roentgenogram again was not informative enough for publication. The report



Patient with extreme hernia uteri gravidi abdominalis (see text).

was as follows: "The fetus is in a horizontal and sagittal plane in relation to the mother. The fetal head is posterior, near the maternal spine, and the fetal buttocks are anterior, in the region of the mother's umbilicus. There are no presenting parts in the maternal pelvis." The estimated date of delivery was July 10, but again the child seemed to be extremely large, so that it was planned to terminate the pregnancy around the thirty-sixth week. The history of toxemia and malposition at the former delivery, with a baby weighing 11 pounds and living only twelve hours, was an important factor in making this decision. Earlier than had been planned, however, on the night of June 3, approximately five weeks before the estimated date of delivery, she was admitted to the hospital with severe labor pains. The condition was the same; the bulging abdomen was again tender; no fetal part entered the

pelvis, and it was decided to terminate the delivery by cesarean section. As was expected, the incision between the symphysis and the umbilicus at the height of the protruding bulge exposed the uterine fundus, and the incision there in the uterus itself immediately brought the breech into the visual field. The child was delivered through the incision by breech extraction. Its weight was 12.2 pounds (5,450 Gm.) in spite of the alleged prematurity. The extremely distended uterus of the "grande multipara," now more than 40 years old, was amputated supravaginally, the large fat apron excised and the fascia doubled. Child and mother were doing well, and on June 13 both were discharged in excellent condition.

COMMENT

I should like to enlarge upon certain details that have received only slight mention in the report of the clinical course. All terms as to the description of the position of the child are used in relation to the plane of the maternal pelvis in the erect position. Basically one may differentiate between longitudinal or vertical positions and latitudinal or horizontal positions. In the first instance the axis of the child is vertical to the axis of the pelvis, as in cephalic and breech presentations; in the second case the axis of the child is oblique or horizontal to the axis of the pelvis, as in shoulder, arm or torso presentations. The latter are definite malpositions, and a mature child cannot be delivered alive spontaneously, unless the horizontal axis of the child is transposed into the vertical position. This is done by cephalic or podalic version.

All terms as to the evaluation of the presentation of the child are used with reference to the presenting part in the parturient canal. Presentations like the one in the case here described are malpositions, in spite of the fact that one may call them correct presentations in the upper birth canal. At the first of these deliveries the child was in the uterus in breech presentation, and at the second delivery in cephalic presentation. Nevertheless a definite malposition existed, since the upper part of the birth canal itself was in a wrong position in relation to the pelvis. In other words, malposition of the whole container, instead of only the contents, was to be dealt with. Consequently the position of the container—the uterus—has to be corrected, and the contents—the child—will be automatically in the right position. That is accomplished during labor by pushing the uterus upward with every pain, by holding it with a binder or by pulling it up by a towel slung over the shoulder of the patient. Greenhill often accomplished engagement by letting the patient squat, so that her own thighs forced the uterus up. For this patient all those procedures seemed too dangerous, too slow and of too questionable value, considering the impending rupture of the uterus, the size of the babies and the coexisting toxemia. Besides, the patient, during her few office visits during her last pregnancy, had considerable pain when the uterus was held up manually. All those manipulations may not be necessary if, prophylactically, the uterus is prevented from falling forward and a binder is worn from the beginning of pregnancy. Unfortunately I never could attempt this procedure, because I did not see the patient early enough.

It is interesting that there were two different presentations, a breech and a cephalic, in the same patient with this anomaly. This condition is called "pendulous abdomen" and is caused by weakness or distention of the anterior abdominal wall.

If the diastasis of the recti muscles is as pronounced as in this case, if the whole uterus falls forward to such a degree that the fundus points downward, it is called "hernia uteri gravidi abdominalis." This weakness of the abdominal wall may be congenital or acquired. In the case just presented one may assume that the fe-

quent bearing of very large children was mainly responsible for the tremendous diastasis of the recti. The apron of fat, by constantly pulling on the abdominal wall, certainly did not improve the condition. No other causes for this hyperanteflexion of the uterus such as deformities of the spine or the pelvis or tumors in the pelvic cavity could be discovered.

I have mentioned the best treatment, which is prophylaxis during pregnancy. Unfortunately I was not able to apply prophylactic treatment, since the patient was never seen early in pregnancy. At the time of the first of these two deliveries, the one delivery with breech presentation, I was able to correct the angulation of the birth canal by pulling the baby's legs down. Since dilatation of the cervix was complete, the delivery could be terminated at once. It should be emphasized again that this manipulation was not version of the child, even though the procedure was similar; it was version or transformation of the *uterine axis* from the horizontal to the vertical plane. The combination of severe preeclampsia, an oversized baby in malposition and an overdistended uterus was the indication for cesarean section in the second instance. The recurrence of severe toxemia in a 40-year-old woman with a pendulous abdomen and malposition, who had borne 8 children of ever-increasing size, was the indication for the Porro operation. At this time an attempt was made also to improve the condition existing in the anterior abdominal wall. To accomplish a perfect cure of the pendulous abdomen a much more extensive and time-consuming procedure than that which I performed would have been necessary, since the diastasis of the recti muscles extended from the symphysis up to the xiphoid. On account of the general condition of the patient I considered it advisable to postpone complete plastic reconstruction of the abdominal wall. I may even abstain from doing it at all, since in this patient the complications resulting from a pendulous abdomen cannot occur again, because of the supravaginal hysterectomy.

ZUSAMMENFASSUNG

Der Verfasser beschreibt zwei Entbindungen einer Mehrgebärenden mit einem Bauchbruch des schwangeren Uterus, die durch Schwangerschaftstoxikose kompliziert waren. Er erörtert den Ursprung, den Mechanismus und die Behandlung der Erkrangung.

RESUMEN

El autor describe dos partos de una "gran multípara" con hernia abdominal del utero an embarazo complicado con toxemia gravídica. Comenta el origen, el mecanismo y el tratamiento.

SUMARIO

O autor descreve dois partos de uma "grande multipara" com hernia uteri gravidi abdominalis complicados por toxemia de gravidez. Discute a origem, mecânismo, e tratamento dêste estado.

RÉSUMÉ

L'auteur décrit deux couches d'une "grande multipara" avec hernie abdominale de l'uterus gravide, compliquées de toxémie de la gestation. Il discute l'origine, le mécanisme et le traitement de cette condition.

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Ophthalmologic and Otolaryngologic Surgery

Transtympanic Mobilization of Stapes as a Treatment for Otosclerosis: An Evaluation

ALAN AUSTIN SCHEER, M.D., F.I.C.S., D.A.B.

NEW YORK CITY, NEW YORK

HAVING observed the results of transtympanic mobilization of the stapes for one and one-half years, I consider it time to make a critical appraisal of this procedure. The observations discussed in this preliminary report are derived from 215 operative cases.

The thinking behind this technic has a sound physiologic basis, and the approach is completely rational. It is based on the knowledge that the underlying pathologic change that causes the hearing loss in persons with otosclerosis is fixation of the footplate of the stapes in the oval window. It has always been assumed that this bony ankylosis, even if incomplete, could not be broken up sufficiently to allow the stapes to become mobile again. Because of this false assumption, fenestration is done to reroute sound through a newly created window in the bony labyrinth. The mobilization operation utilizes the normal ossicular conduction system to carry sound to the cochlea.

The proper exposure for the mobilization operation is obtained by reflecting the posterior half of the tympanic membrane and the contiguous skin of the auditory canal forward and over upon itself, thus exposing the incus and stapes. An attempt is then made to break up the ankylosis by rocking the stapes in its physiologic plane. At this time it has been definitely shown that stapes fixation in certain cases is reversible, and that by delicate instrumental manipulation the stapes may be mobilized and the hearing restored.

Transtympanic mobilization is not new, for as early as 1888 Kessel,[1] Boucheron,[2] Miot[3] and Faraci[4] were employing this method to mobilize the stapes through a miringotomy.

In 1953 Rosen[5] developed a new technic and special instruments for lifting up the intact drum and mobilizing the fixed stapedial footplate. He removed enough of the edge of the posterior bony canal wall to expose the entire stapes and stapedial tendon. It is basically his method that was used in the 215 cases from which are drawn all the observations in this report.

Hyaluronidase is added to a mixture of 2 per cent xylocaine (3 cc.) and epinephrine (1 cc. of 1:1000). The effectiveness of this local anesthesia thus induced goes far beyond the scope of this operation. One and one-half cc. of the solution is injected into the soft tissue at three points just external to the bony portion of the external auditory canal (Fig. 1). Unnecessary injection into the tragus may produce transient facial paralysis.

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Since the stapes is always in the posterior superior quadrant, the incision is made from 12 to 6 on the posterior canal wall from the roof to the floor, about 7 mm. external to the drug (Fig. 2*A*). It is always better to make the incision a little more external to the drum than necessary, rather than too close, since the skin may tear or a large part of the annular rim may be removed during this procedure. With a small elevator the skin is raised from the bony canal down to the annulus of the tympanic membrane (Fig. 2*B*). The middle ear is opened when the fibrous annulus is lifted out of its sulcus (Fig. 2*C*). The tympanic membrane is then folded over forward upon itself, which exposes the posterior half of the middle ear (Fig. 2*D*). In 25 per cent of cases there will be immediate exposure of the entire tendon of the stapedius muscle and the long arm of the incus with its attachment to the head of the stapes.

Whether or not any bony annular rim is removed depends on whether there is adequate visibility of the stapedius tendon. Exposure of the tendon is absolutely necessary to judge the mobility of the stapes, since a mobilized stapes when moved will cause shortening of this tendon. Frequently, when the drum is elevated, only the lower tip of the incus is visible, without any portion of the stapedius tendon coming into view (Fig. 2*E*). This necessitates removal of part of the posterior superior bony annular rim (Fig. 2*F*).

An attempt is made to mobilize the stapes after a delicate instrument has been applied to the anterior aspect of its neck. The accurate placement of this instrument can be accomplished only after much practice on the cadaver, for the neck of the stapes is only 1 mm. long. Rather than slide the mobilizer up and down on the anterior crura before feeling the niche in the neck of the stapes, one reverses the

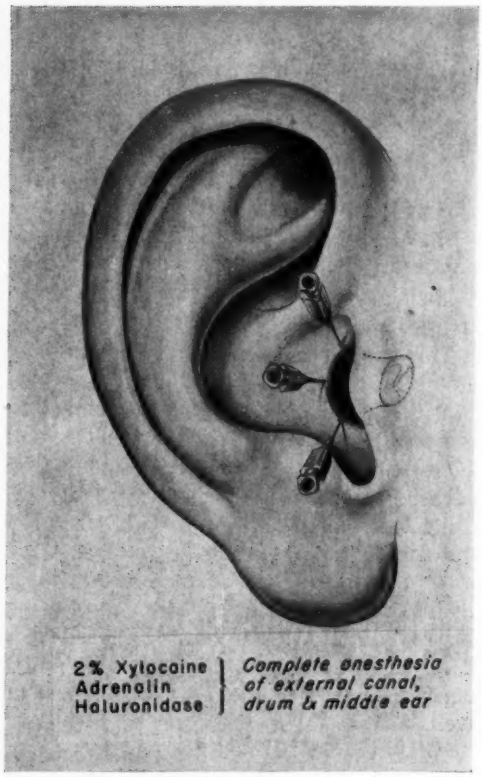

Fig. 1.—Technic of local anesthesia (see text).

technic. First, the instrument is applied to the anterior portion of the incus next to its lenticular process and the incus is moved posteriorly, just slightly on the head of the stapes. The instrument is then dropped slightly deeper until it falls on the first solid part, which is the neck of the stapes. The exact location is not visible. Too deep an application will fracture the crura, and too shallow an application will separate the incudostapedial joint. After sufficient experience, direct application of the mobilizer to the neck of the stapes is possible.

A slow pulsating pressure applied by the mobilizer for short intervals is the safest type to exert. This enables the surgeon to maintain complete control of the instru-

ment, which is vital. Certain stapes that are extremely fixed will require reapplication of the pressure twenty to thirty times before being mobilized. The most important point to remember with a strongly fixed stapes is that the same degree of pressure must be used with each application and should not be increased each time when the previous applications of the instrument have failed. This critical degree of pressure can be gained only with experience.

The majority of stapes that become mobilized will do so without an audible click. Some will give a dry creak and occasionally an actual click when moved. Definite stiffness is noted in the motion of some stapes after they are mobilized. Continued manipulation of these stiffly moving stapes does not always make them move any more freely. In all of the cases in this series in which maximum hearing improvement was obtained there were freely moving stapes. Patients who had a smaller degree of motion never heard as well.

After the stapes has been mobilized or its crura fractured, the tympanic membrane and the contiguous skin of the external auditory canal are replaced in their original position. It is undesirable to use any packing in the external auditory canal; and, in recent cases, sterile cotton in the outer part of the canal has replaced the mastoid dressing. The patient is advised to change the cotton as often as necessary when it becomes soiled with secretion.

There is no doubt that this transtympanic mobilization technic can restore hearing in certain cases of stapes fixation, but certainly all stapes cannot be mobilized. The wide variations in the degree of fixation and in the physical structure of the stapes are the final determining factors in the outcome of each operation. There is an entirely different "feel" to a stapes that is partially fixed from that observed with one that is completely immobile. Certain stapes that feel completely and solidly fixed will mobilize after prolonged manipulation — and, of course, others will fracture. It is difficult to visualize the mobilization of a stapes when the footplate has been to a large extent replaced by the otosclerotic process. Correct application of the mobilizer informs one whether there is any spring or "give" to the stapes, indicating partial fixation. When the stapes is too strongly fixed, the applied pressure will cause the crura to fracture next to the footplate, always with an audible click. Since the hearing of all patients accepted for surgical treatment is below the 30-decibel level, fracture of the crura will not aggravate the hearing loss.

In the present series the stapes in a few cases of advanced fixation seemed to be rotated forward, so that the posterior pole of its footplate was probably lifted slightly out of its normal position in the oval window. This seems evident, because when one of these firmly fixed stapes becomes mobilized its head shifts back into an entirely new position, in which it remains. The shifting of a fixed stapes occurs suddenly, and extreme control of the instrument is required to prevent its avulsion from the oval window. It is in this new position that the hearing is restored. This is only a clinical observation.

It is important to be able to estimate preoperatively the degree of fixation, since this will help in establishing the probability of successful mobilization. The audiogram, though it is extremely helpful in diagnosing otosclerosis, has little value in determining the probability of successful mobilization if the air conduction loss exceeds 40 decibels in the lower frequencies. This statement is made because the degree of stapes fixation is not always in direct proportion to the hearing loss. In the

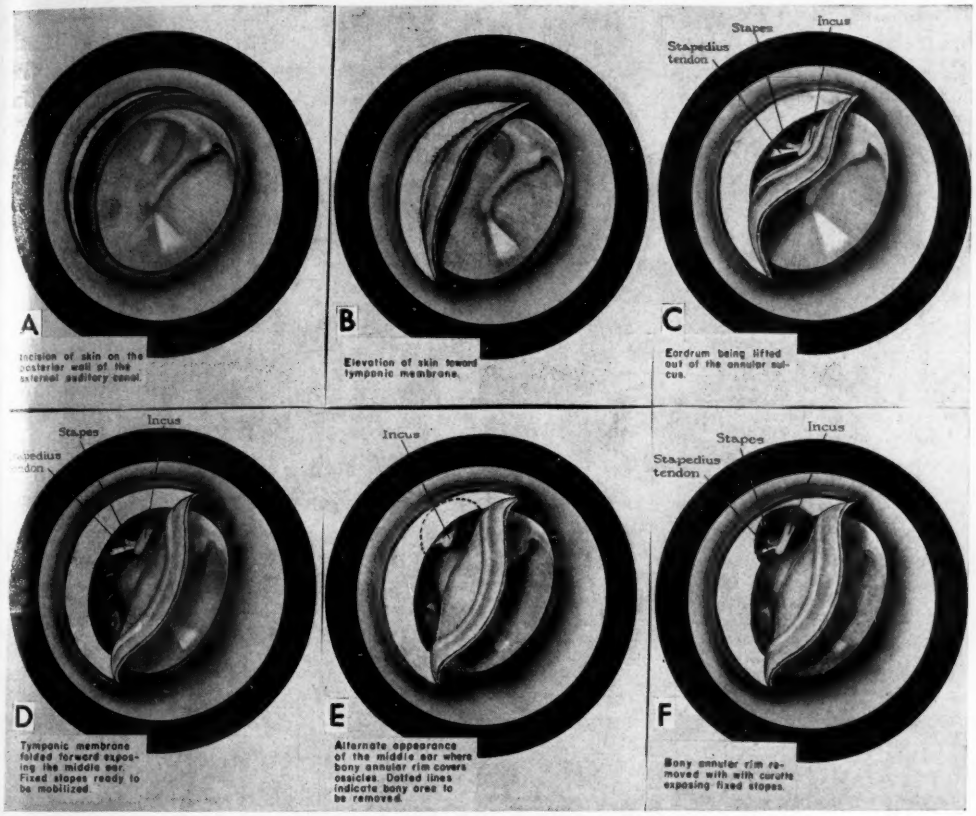
A
Incision of skin on the posterior wall of the external auditory canal.
B
Elevation of skin toward tympanic membrane.
Stapes
Incus
Stapedius tendon
C
Eardrum being lifted out of the annular sulcus.
Stapes
Incus
D
Tympanic membrane folded forward exposing the middle ear. Fixed stapes ready to be mobilized.
Incus
E
Alternate appearance of the middle ear where bony annular rim covers ossicles. Dotted lines indicate bony area to be removed.
Stapes
Incus
Stapedius tendon
F
Bony annular rim removed with with curette exposing fixed stapes.

Fig. 2.—Technic of operation.

same person with an equal bilateral loss, one stapes can be immovable and the other only moderately fixed. There is no correlation between the age of the patient or the duration of the hearing loss and the degree of stapes fixation.

The following pertinent facts justify mention:

1. When the result of the Rinne test was negative with the 512 fork, but it was still equal (AC = BC) with the 1024, it was observed that the stapes was not completely fixed and could usually be mobilized.
2. If the result of the Rinne test was negative with the 512 and 1024 forks, but the patient could hear a loud voice at five feet, the stapes would usually be firmly fixed. Fifty per cent of such fixed stapes can be mobilized. This is certainly not a hard and fast rule, however, for in many cases with these negative Rinne responses there is only partial fixation of the stapes.
3. If in the presence of a negative Rinne response with the 512 and 1024 forks the patient cannot understand extremely loud conversation beyond a distance of two feet, the stapes will be too firmly fixed to mobilize.
4. Patients who cannot hear without their hearing aid have a stapes that is usually too firmly fixed.

The cases in which the greatest percentage of good results is obtained are those in which there is a negative Rinne response with the 512 fork, but air and bone

conduction are still equal with the 1024 fork.

No complications resulting from this operation have occurred in the 215 cases. The stapes was never avulsed. After mobilization there has been occasional labyrinthine vertigo, accompanied by nystagmus lasting three to four minutes. Thirteen traumatic perforations were produced during the process of elevating the annulus out of its sulcus. Eleven of these perforations healed spontaneously. Nine minor postoperative infections developed, all of which were controlled with antibiotics. It is important to remove all the bony spicules from under the flap, since these will act as sequestra. Involvement of the facial nerve has been completely avoided, since all of the curetting is done external to the level of the stapedius tendon.

Results.—Observations have been made on 215 operative cases. The results of the first 100 cases will be reviewed since the patients have been followed for ten to eighteen months and the data on them are therefore significant:

1. Ninety-seven stapes were fixed at the time of operation, and 3 were mobile.
2. Thirty stapes had their crura fractured.
3. Sixty-seven stapes were successfully mobilized.

The cases in which mobilization was achieved can be divided into two groups: Group A, in which there is marked improvement in hearing, and Group B, in which there is little or no gain. For a case to be classified in Group A, all the speech

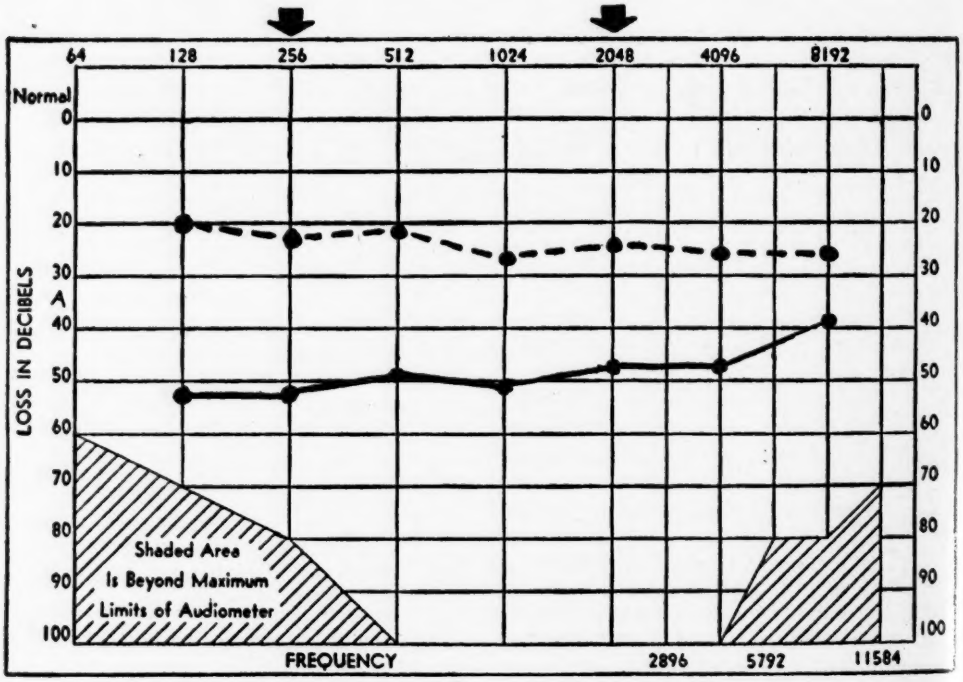

Fig. 3.—Average preoperative and postoperative audiogram.

frequencies must be at or above the 30-decibel level. Thirty-three of the cases fall into Group A and 34 into Group B.

The air conduction in 13 of the 33 cases in Group A reached the preoperative bone conduction level. In the 20 remaining in Group A there was marked improvement above the practical 30-decibel level, but the air conduction did not equal the bone conduction.

The composite average preoperative and postoperative audiogram of the 33 cases in Group A is shown in Fig. 3. From this it can be shown that the average decibel improvement in each frequency is as follows:

128	256	512	1024	2048	4096	8192
33 db.	29 db.	27 db.	25 db.	23 db.	20 db.	12 db.

The return of hearing in the operating room to the patients of Group A was often dramatic. As soon as the stapes was mobilized these patients noted an increase in the loudness of the spoken voice and various noises in and outside the room. It was an emotional moment for many of the women. Several patients who spoke with very low voices before the return of their hearing were noted to have an increased volume in their speech immediately after the procedure.

At the time of this preliminary study, the reason for failure to obtain a greater hearing improvement in the Group B patients with mobilized stapes can only be conjectured. It is reasonable to think that if a stapes has been fixed about a large portion of the perimeter of the footplate, the irregularity of the fractured area (if it actually is a fracture) would prevent its normal movement within the oval window. If the annular ligament or footplate had been replaced to any extent by the otosclerotic process, the stapes could not be expected to vibrate normally unless the fracture line through the otosclerotic process was linear and regular in type or the area of disease causing the fixation was small.

If clinical improvement in hearing was obtained, it was always noted at the time of the operation. The maximum audiometric improvement was always obtained within five days unless a clot remained in contact with the tympanic membrane.

Of the 33 patients in Group A, 28 have maintained their original hearing improvement for a period varying from fourteen to eighteen months. Four have had a sufficient drop to offset all of the original gain.

In the 4 patients whose hearing returned to the preoperative level, this occurred within a month. In 1 ear a postoperative infection developed under the skin flap and the loss was quite rapid. The hearing did not return when the infection cleared.

The 4 patients in Group A whose hearing dropped to the preoperative level after successful mobilization underwent revisions. The same surgical procedure was done. The skin of the posterior canal wall can be elevated more easily the second time, because it is slightly thicker and not as adherent to the underlying bone. The drum folds forward more easily, because the annulus does not have to be lifted out of its sulcus. Since all the bony annular rim necessary for the proper exposure has been removed at the original operation, the secondary procedure becomes simpler. In the 4 cases of revision there was recurrence of stapes fixation, and in all but 1 the stapes was as firmly fixed as at the original procedure. All could be remobilized. The hearing in each case was returned to approximately the level attained with the first mobilization. One of these ears has undergone two revisions, but the Group A hearing improvement obtained was completely lost within two weeks after each procedure.

In 10 cases in which the original mo-

bilization had failed because the stapes was fractured, the operation was attempted on the opposite ear. In 3 cases it was again unsuccessful, because the stapes were too fixed and therefore were fractured. In 7 cases mobilization was successful, producing 3 Group A results and 4 Group B results.

A fenestration was performed on 1 patient who had undergone bilateral mobilization without success (fractured stapes). Fenestration was performed on the ear nine weeks after the mobilization, at which time the skin of the external canal was completely healed and the drum had a normal luster. No unusual difficulty was encountered in preparing the tympanomeatal flap, or at any time during the procedure. A satisfactory improvement in hearing has been maintained for one year. Despite the fact that only 1 fenestration has been performed after an unsuccessful mobilization, it is my opinion that other cases should not differ, provided the tympanic membrane is intact and the skin of the external canal completely healed.

Several patients in this series had bone conduction near the 30-decibel level in the middle frequencies and occasionally below this at the 2048 frequency, yet they were able to enjoy enough hearing improvement to make a tremendous difference. This potentially comprises a large group of patients who before this had no alternative except a hearing aid, since a satisfactory result could not be obtained by fenestration.

CONCLUSIONS

Transtympanic mobilization of the stapes has been so devised that it can be used as an adjunct to the present-day surgical therapy of otosclerosis. Through this technic it has been learned that partial fixation of the stapes is often reversible. In a series of 100 cases, 33 per cent of the patients obtained a hearing improvement up to or above the practical 30-decibel level in the speech frequencies. Eighty-one per cent have maintained this gain for twelve to eighteen months.

The tinnitus of those patients who obtained a Group A result (marked improvement in hearing) was greatly diminished or, more frequently, disappeared entirely.

There is difficulty in determining the degree of stapes fixation prior to operation, since there is frequently no correlation between it and the amount of hearing loss. Tuning forks may be of some value here.

It has also been shown that a successful fenestration can be performed after an unsuccessful mobilization.

SCHLUSSFOLGERUNGEN

Die transtympanische Mobilisierung des Steigbügels ist so ausgearbeitet worden, dass sie sich als Hilfsmittel in der modernen chirurgischen Behandlung der Otosklerose verwenden lässt. Diese Technik hat gezeigt, dass eine partielle Fixierung des Steigbügels oft reversibel ist. 33 Prozent einer Krankenserie von 100 Fällen erreichten eine Verbesserung des Hörvermögens über das praktisch ausreichende Niveau von 30. Decibels im Bereich der Sprachfrequenz. 81 Prozent dieser Kranken behielten ihren Hörgewinn 12 bis 18 Monate lang.

Das Ohrenklingen der Kranken, die einen als mit Gruppe A bezeichneten Hörgewinn erzielten, war erheblich herabgesetzt oder verschwand, was noch häufiger vorkam, völlig.

Es ist schwierig, vor der Operation den Grad der Steigbügelfixierung zu bestimmen, da er häufig in keiner Beziehung zum Umfang des Verlustes der Hörfähigkeit steht. Stimmgabeluntersuchungen können aber eine gewisse Hilfe bieten.

Es hat sich herausgestellt, dass nach einem erfolglosen Mobilisierungsversuch

eine erfolgreiche Fensterungsoperation ausgeführt werden kann.

CONCLUSIONS

La mobilisation transtympanique de l'étrier est tellement établie, qu'elle peut être regardée comme aide dans la therapeutique présente de l'otosclérose. Par cette technique on a appris, que la fixation de l'étrier est souvent reversible. Dans une série de 100 cas 33% des patients ont obtenu un amélioration de l'ouie jusqu'à, ou au dessus du niveau des 30% de fréquences pratiquement perceptibles. 81% ont mintenu ce gain pendant 12 a 18 mois.

Le tinnitus des malades, qui obtinrent un résultat de groupe A fut fort diminué et plus souvent il disparut complètement.

La difficulté est de déterminer le degré de fixation de l'étrier avant l'opération, puisque souvent il n'est pas proportionel au degré de la perte de l'ouie. l'usage des diapasons sera peut être d'une certaine valeur.

On a aussi trouvé, qu'on peut obtenir de bon succès d'une fenestration après avoir eu du mauvais succèe d'une mobilisation.

CONCLUSIONI

La mobilizzazione transtimpanica della staffa è stata ideata in modo da poter trovare impiego nella terapia chirurgica dell' otosclerosi. Si è imparato che la fissazione parziale della staffa è spesso reversibile. In una serie di 100 casi, il 33% dei malati ha ottenuto un miglioramento della funzione uditiva; l'81% di essi ha conservato tale miglioramento per un periodo da 12 a 18 mesi.

I ronzii auricolari diminuirono grandemente o scomparvero del tutto nei malati del gruppo A.

Vi è una certa difficoltà nello stabilire preoperatoriamente il grado di fissazione della staffa poichè spesso non vi è nessun rapporto fra questo data e la diminuzione dell'udito.

E' stato anche dimostrato che è possibile eseguire con successo una fenestrazione dopo aver fatto una mobilizzazione senza risultato.

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I have spoken of liberty as a good, but it is not an absolute good. We all recognize the need to restrain murderers, and it is even more important to restrain murderous states. Liberty must be limited by law, and its most valuable forms can only exist within a framework of law.

—*Russell*

Condylectomy for Metatarsalgia: Indications and Results

HARVEY E. BILLIG JR., M.D., F.I.C.S.

LOS ANGELES, CALIFORNIA

METATARSALGIA is a term applied to pain, due to various causes, in the fore part of the foot, with or without radiation into a toe.

The type of metatarsalgia to be discussed in this paper is localized pain, aggravated by weight bearing, in the area of the plantar aspect of one or more metatarsal heads, accompanied by a localized plantar callus.

The callus is frequently mistaken for a plantar wart (verruca plantaris), as has been pointed out by Du Vries[1] of Chicago. The mechanism of its production is that of fibrous tissue proliferation and cornification over the spurlike plantar projections of the two bony plantar condylar extensions of the joint surface of the metatarsal head in the groove between which the long flexor tendon runs to the toes. The condyle on the fibular side is usually the more prominent and hence more commonly involved.

A great deal of discussion has arisen as to whether these are plantar warts or calluses over the projecting condyles. Du Vries[2] has reported follow-ups on a number of cases in which surgical removal of the projecting condyles, without special attention to the callus itself, has resulted in prompt elimination of the metatarsalgia and disappearance of the callus.

There are several factors supporting the thesis that these are callus formations rather than verrucae.

1. The thickening and cornification tend to occur directly over the plantar surface of the condyles, and the patient complains of pain in the same location on weight bearing or deep palpation.

2. Pathologic sections of the area reveal no specific histologic changes other than those secondary to intense callus formation. Grossly the central area, with its cauliflower-like appearance and/or its suggestion of necrosis, does resemble a wart. Histologically, however, its appearance is that of fraying fibrous tissue and necrosis due to a poor central blood supply secondary to intense callus formation. Similar central fraying and necrosis are often seen in neglected bunions and in calluses over exostosis of the head of the first metatarsal.

3. The condition is frequently observed in persons with mechanical malalignment causing an increase thrust on the plantar condyles, ascribed to (a) poliomyelitic deformities; (b) arthritic deformities, and (c) malfunction of the feet due to the wearing of incorrect shoes and walking on nonresilient surfaces.

In walking or running, the stabilizing muscles of the ankle hold their position,

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plantar flexion of the toes being supposed to give the forward thrust of the "take-off." Owing to the conformation of the shoes and/or weight bearing on a non-resilient surface, the toes cannot exert the plantar flexion required to perform this function, so the forward thrust becomes plantar flexion of the foot only, forcing the plantar condyles of the metatarsal heads sharply against the sole of the shoe with every step. The kinetic sequence has been well analyzed by Prof. Laurence E. Morehouse[3] (University of California at Los Angeles), who has developed a "ripple sole" to allow toe to function properly.

. A comparable example of callus formation may be observed in the hand of a ditch digger, in which the constant pressure of the shovel handle on the palmar surface over the metacarpal heads produces exceedingly thick overlying calluses. The thick calluses developing over tendon sesamoid of the great toe, the medial aspect of the exostosis of the head of the first metatarsal (bunion), the so-called tailor's bunion, the callus over the dorsum of the joint in cases of hammer toe, and calluses appearing wherever there is constant outside pressure friction irritation (e.g., from the shoe) are all examples of the same protective measures taken by the body in attempting to wall off and guard the underlying structures from injury. Unfortunately, owing to weight bearing, the callus on the sole over the condyles only aggravates the situation. Removal of the offending bony projection, the condyle, eliminates the pressure point in just the same way as does removal of the bony exostosis underlying a bunion. It is well recognized that the bunion callus need not be removed; it will disappear by itself once the underlying bony projection is eliminated.

In line with the general tendency of the body to protect these areas from pressure friction, bursae and/or sesamoids develop

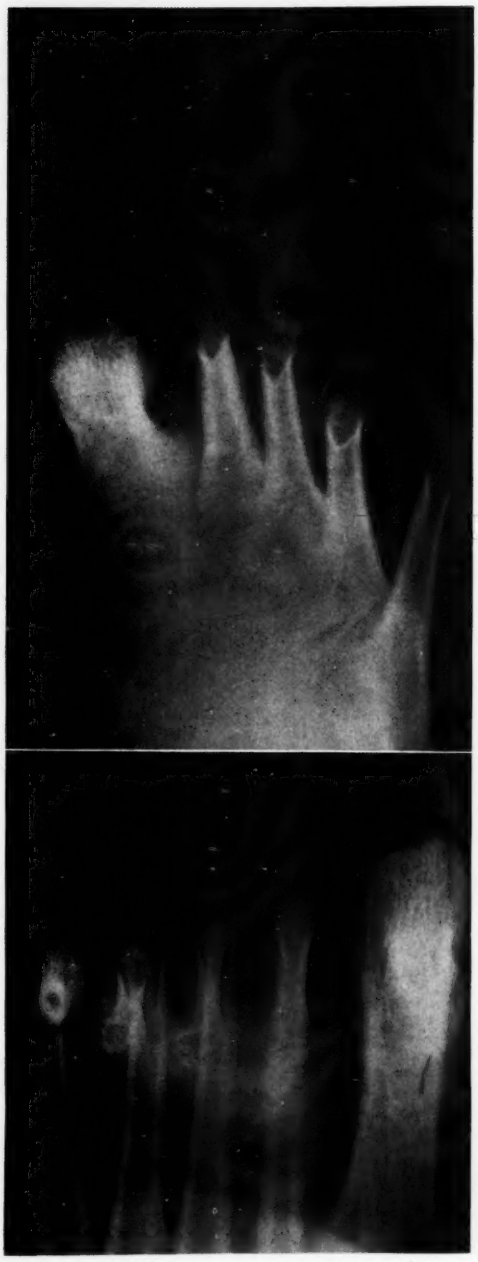

Fig. 1.—Preoperative views, showing depressed contour of third metatarsal bone in a case of metatarsalgia.

wherever undue pressure friction occurs.

Verrucae are highly vascular and occur only incidentally over a weight-bearing surface point.

Excision of the plantar condyles may be carried out through either a dorsal or a plantar incision.

In the dorsal approach, a longitudinal incision is made over the metatarsal phalangeal joint, the extensor tendon is retracted to the side and a longitudinal incision is made in the capsule. The capsule is reflected and retracted to either side, so as to expose the head of the metatarsal. Then, with the surgeon's thumb in the sole pressing dorsally on the metatarsal head, the toe is dislocated plantarward at the metatarsal phalangeal joint. This exposes the surface of the condyles curving plantarward from the distal joint surface of the head. A sharp osteotome is then placed at the juncture of the condyles and their continuance as the joint surface of the head and is angled parallel to the metatarsal shaft. A single sharp mallet blow to the osteotome will neatly "knock off" the condyles, which may then be picked out of the wound. The dislocation of the toe is then reduced and the capsule and skin sutured.

In the plantar approach, a 3-inch (1.9 cm.) longitudinal incision is made over the metatarsal proximal to the condyles. A ½ inch (1.2 cm.) sharp osteotome is then inserted with the blade parallel to the shaft and worked under the flexor tendon next to the bone; then the osteotome is turned 90 degrees and the cutting edge slid distalward along the metatarsal shaft until it impinges on the condyles where they join the shaft. The osteotome is then angled as closely parallel to the shaft as will be allowed by the position of its handle against the heel. Again a sharp blow to the osteotome with the mallet will neatly "knock off" the condyles, which may then be picked out of the wound, any remaining capsular attachments being severed in the usual manner with the tips of curved scissors. Except for the initial incision to allow insertion of the osteotome, the operation is carried out "blind."

This operation is very simple, allows immediate ambulation, can be carried out as an office procedure with local anesthesia, does not disrupt the metatarsal phalangeal joint and enables patient and surgeon to avoid the more radical procedures (e.g., removal of the metatarsal head) with their additional disturbances of weight bearing.

A typical case was that of a 37-year-old man with a twenty-year history of "pap" under the third metatarsal head. This had been treated by several physicians successively, by cautery, desiccation, excision of the "pap" and roentgen therapy (two treatments of 300 roentgens each). Figure 1 is a preoperative film showing the depressed contour of the third metatarsal bone. Figure 2 is a postoperative film taken with the patient standing and the toes maximally dorsiflexed so that the metatarsal heads are "stubbing" into the roentgen plate placed on the floor. The roentgen beam was directed downward past the sole of the heel, thus showing the condyles of the metatarsal head in bold relief. Condylectomy of the third metatarsal head was performed. Figure 3 is a postoperative film in contrast to Figure 2. Postoperatively the patient was up and walking the second day, stating that the "sore spot" was gone, and within eight weeks the "pap" had completely disappeared.

His case is typical of the many in which this operation has been done since it was established several years ago as a part of the routine at the Billig Clinic. Reports of operative results by surgeons who were taught this technic in postgraduate courses in surgery of the foot, presented by the Billig Clinic have been enthusiastic, and

Fig. 2.—Postoperative views (see text).

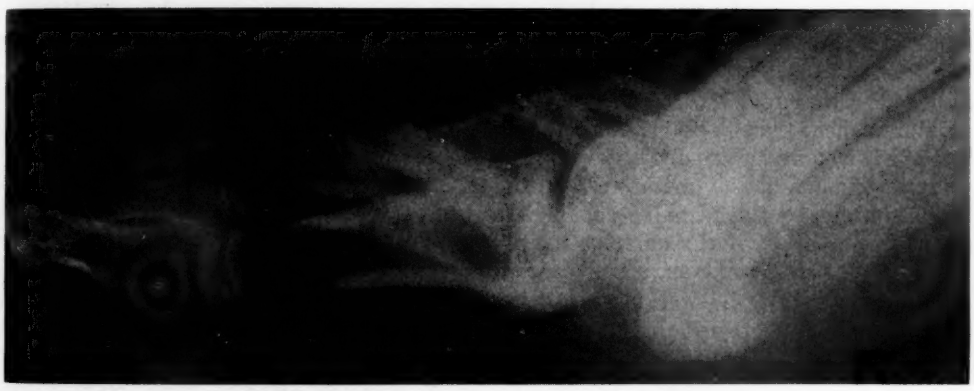

Fig. 3.—Postoperative film in contrast to Figure 2.

the cases are now being documented to add to the series and will be reported in detail later.

It has been mentioned in the discussion of etiologic factors that poor foot posture and/or walking on nonresilient surfaces will cause a sharp abnormal thrust of the condyles of the metatarsal heads into the shoe in the forward thrust take off in walking or running, and that careful examination of these patients revealed abnormal use of the foot in attempts to relieve this pressure. The postoperative course of healing has been greatly improved by routine use of the anterior metatarsal bar on the shoe (Fig. 4), which

Fig. 4.—Corrective shoes (see text).

aids in correcting the distorted posture and allows restoration of the proper take-off position of the toes, thus relieving the condyles of abnormal pressure. In several operative cases in which the anterior metatarsal bar on the shoe was not used, it was observed that, although the metatarsalgia and callus over the condyles of one metatarsal head had been relieved, there developed a similar condition over the condyles of an adjacent metatarsal head. This has been prevented in all recent cases by routine addition of the anterior metatarsal bar on the shoe for six months after the operation.

COMMENT

Characteristic symptom-producing developmental variations of bony structure, notably of the lower part of the back and of the feet, have received considerable attention.

The problem of varus of the first metatarsal in the atavistic or prehensile type of splayfoot has been solved by realignment of this bone to bring its distal portion into line with the other metatarsals, as advocated by Billig[4] and Lapidus.[5] McKeever[6] corrects the relatively longer metatarsal[7] with its protruding condyles by shortening the metatarsal and resetting its head backward and angled slightly dorsal to its original position. As has been pointed out by Compere,[8] the offending plantar prominence of the condyles (Fig. 1) may really be due to an abnormal developmental plantarward contour of the metatarsal bone. This can best be corrected by angulation osteotomy[4] near the base of the metatarsal. Compere[8] has corrected the abnormal contour of the metatarsals in such instances by wedge osteotomy at the base, with satisfying results, and has emphasized the fact that all the offending metatarsals in any given foot should be corrected at the time of operation; otherwise the uncorrected condyles will have to bear the brunt of the additional pressure, and symptoms will be produced.

Condylectomy, a comparatively simple operation, nevertheless is sufficient in many instances to give satisfactory relief, without the necessity of resorting to angulation osteotomy.

SUMMARY

1. The type of metatarsalgia due to abnormal pressure of the condyles of the metatarsal head is defined.

2. Differential diagnoses between verruca vulgaris and plantar callus is discussed.

3. Surgical excision of the plantar condyles of the metatarsal heads by a dorsal or ventral approach, as palliative treatment for removal of the abnormal pressure point, is described.

4. Postoperative results are indicated.

5. Restorative kinetic pedal function aided by anterior metatarsal bar on the shoe for six months after the operation is advised.

ZUSAMMENFASSUNG

1. Die Form des Mittelfuss-Schmerzes, die durch abnormen Druck auf die Gelenkhöcker des Metatarsalkopfes hervorgerufen ist, wird erklärt.

2. Die Differentialdiagnose zwischen der gewöhnlichen Warze und der Kallusbildung der Fussohle wird erörtert.

3. Die chirurgische Resektion der plantaren Gelenkhöcker des Metatarsalkopfes auf dorsalem oder ventralem Wege als palliative Behandlung zur Entfernung des unnormalen Druckpunktes wird beschrieben.

4. Die postoperativen Ergebnisse werden dargelegt.

5. Zur Wiederherstellung des normalen Bewegungsmechanismus des Fusses wird die Zuhilfenahme einer vorderen Metatarsalschiene, die für die Dauer von sechs Monaten nach der Operation am Schuh angebracht ist, empfohlen.

RESUMEN

1. Se define el tipo de metatarsalgia producido por la presión sobre los cóndilos metatarsianos.

2. Se dicute el diagnóstico diferencial entre verruga vulgaris y callo plantar.

3. Se describe la extirpación quirúrgica de los cóndilos de las cabezas de los metatarsianos por la vía dorsal o ventral, como tratamiento paliativo para eliminar el sitio de presión anormal.

4. Se señalan los resultados postoperatorios.

5. Se recomienda la restauración de una función pedálica quinética por medio de una barra que se coloca en el zapato durante un tiempo de seis meses después de la operación.

RÉSUMÉ

1. Le type de metatarsalgie, causée par une pression anomale sur les condyles de la tête metatarsale est défini.

2. Le diagnostic différentiel de verruca vulgeris et callus plantaris est discuté.

3. L'excision chirurgicale des condyles plantaires de la tête metatarsale par une incision dorsale ou ventrale est décrite comme traitement paliative de la pression anormale.

4. Les résultats postopératoires sont exposés.

5. On recommende la restoration de la fonction kinetique du pied aidée par un renforcement metatarsale anterieur sur le soulier pendant 6 mois après l'opération.

SUMARIO

1. O tipo de metatarsalgia devido a pressão anormal sôbre os côndilos da cabeça metatársica é definido.

2. São discutidos os diagnósticos diferenciais entre verruca vulgaris e callus plantar.

3. A excisão cirúrgica dos côndilos plantares das cabeças metatársicas por via dorsal ou ventral, como tratamento paliativo para remover o ponto de pressão anormal, é descrita.

4. Os resultados pós-operatórios são indicados.

5. A função pedalar cinética restaurativa auxiliada por barra metatársica anterior no sapato durante seis meses após a operação é aconselhável.

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With perfect gentleness and prodigious patience, with the rubber gloves and new methods, Halsted extended the range of his operations. He removed cancer of the breast with much greater permanent success than had ever been achieved before. He repaired hernias, and those repairs lasted until the end of the patient's life. He had a special fascination for aneurysms, those balloon-like swellings which grow upon large arteries, caused by weakness in the layers of its wall which pulsates with each beat of the heart, and are filled with a tiny whirlpool of blood and which may burst and cause rapid death. Halsted invented new ways of tying them off and causing the aneurysm to disappear.

Once, in the middle of the night and without assistance, he operated upon his own mother for gallstones, and prolonged her life by two years. That was surely a test for a man and a surgeon, and like every other operation that he performed, it engaged his organized faculties and roused the love that lay in the very touch of his fingers.

This perfectionist in the operating theater, this neurotic in his social life loved to direct and discipline the careers of his pupils, to evoke their potentialities and rouse in them pure devotion to the science of surgery, making it almost a religious cult. "We wish to have men who have learned to work for truth's sake, who find in work and the search for truth their greatest reward," he said. Posterity honors Halsted, but those who worked near him had mixed feelings towards their inscrutable chief. They dreaded the sidelong squint of his myopic blue eyes, the soft silky voice which conveyed blistering sarcasm. His personality seemed to be surrounded by a dense vacuum. He would peer at people like a wary animal. Deliberately, he would take out a cigarette, but never offer one, and then light it slowly without speaking, as though giving himself time to sharpen his claws.

—*Williams*

Plastic and Reconstructive Surgery

Homogenous Knee Meniscus in Otoplasty

A Clinical-Pathologic Study

THOMAS RAY BROADBENT, M.D., F.A.C.S., F.I.C.S.

SALT LAKE CITY, UTAH

CONSTRUCTION of the external ear is difficult and in many instances a most unsatisfactory procedure. The majority of reconstructed ears lack detail, often gross configuration and proper positioning. The purpose of this report is to present the clinical and pathologic study of 12 cases of total or subtotal ear reconstruction, with use of the knee meniscus as the supporting framework. The reader is referred to the literature for other methods of supplying the framework for ear reconstruction.[1] Frequent failure in this task has led some to prefer prostheses over operation.[1e] One always strives for a better supporting framework that will allow construction of an ear with greater detail in a minimum of operative procedures. In general, one first supplies a hairless auricular area; sculptured cartilage is buried beneath the skin, and the new ear is mobilized from the head.

At all times, the desire and compulsion to save and utilize healthy tissue prompted the storage and preservation of the knee

From the Department of Surgery, University of Utah School of Medicine, Division of Plastic Surgery, and the Latter-day Saints Hospital, Salt Lake City, Utah.

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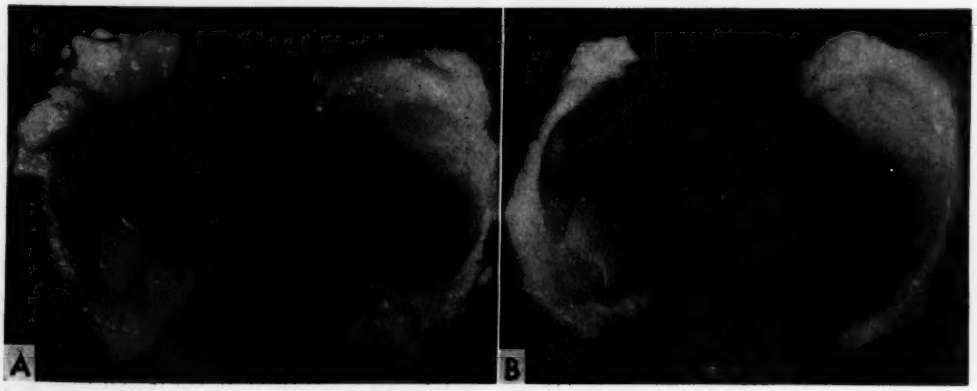

Fig. 1.—*A*, fresh homogenous knee cartilage. There being no pericondrium on this fibrocartilage, the connective tissue that is often removed is bulky. *B*, menisci shown in *A* after removal of the attached connective tissue and fat.

meniscus so leisurely discarded by the orthopedic surgeon. Study of these cartilages and particularly of their gross configuration stimulated their use in total and subtotal reconstruction of the ear. The study here reported was begun three years ago, and early enthusiasm equaled that of Mir y Mir, as reported in 1952.[2]

Method of Study.—Twelve cases of total or subtotal reconstruction of the ear are included in this study. All cases represent unilateral reconstruction on male patients —10 white and 2 Navajo Indian. Ears that were medium-sized or small, or with only curled or lopped abnormalities, are not included. Knee menisci (fibrocartilage) obtained fresh in 3 instances, and preserved in 1:4,000 aqueous merthiolate for six months in 6 cases and for one year in 3, were used as the supporting framework of the ear. In 4 of the 12 cases the cartilage, stored for six months in 3 instances and obtained fresh in 1, was inserted into a subcutaneous abdominal tunnel. These, and 5 other cases of abdominal implants not carried to completion, established the observation that the changes in the implants were grossly and microscopically alike, whether placed first in the abdomen or the mastoid area. This was to be expected, since freedom from scarring and relatively equal vascular conditions exist in the two areas. The cartilage was placed directly into the mastoid area in 8 of the 12 cases. The hairy area was not replaced with a free full-thickness graft before implantation, in order to maintain vascular conditions equal to the abdominal site. At the end of two and three months the cartilage in the abdominal wall was removed, subjected to biopsy and transferred to the mastoid area. The cartilages in the mastoid area were mobi-

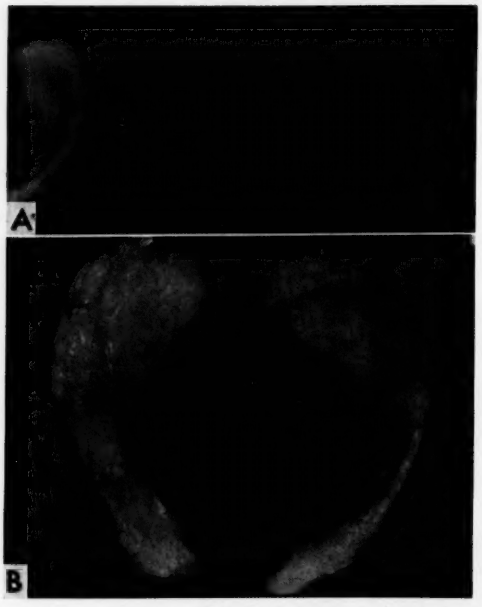

Fig. 2.—*A*, varying sizes of cartilage, with differences in form and curvatures suitable for reconstruction of either the right or the left ear. *B*, knee cartilage (fibrocartilage) stored in 1:4,000 aqueous merthiolate at ordinary refrigerator temperature. Over a period of eighteen months the gross form, size and resiliency are not changed.

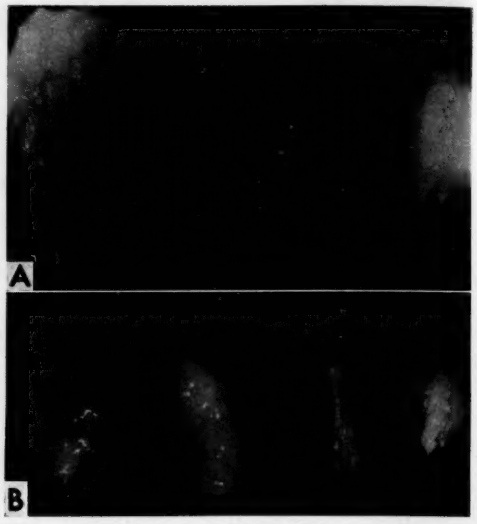

Fig. 3.—*A*, cartilage implants removed at three, six and twelve months respectively. There has been progressive shrinkage, loss of form and rigidity. *B*, cartilages removed from the abdomen and mastoid which, at the end of one year, have lost their original size, form and rigidity, to persist only as globular masses.

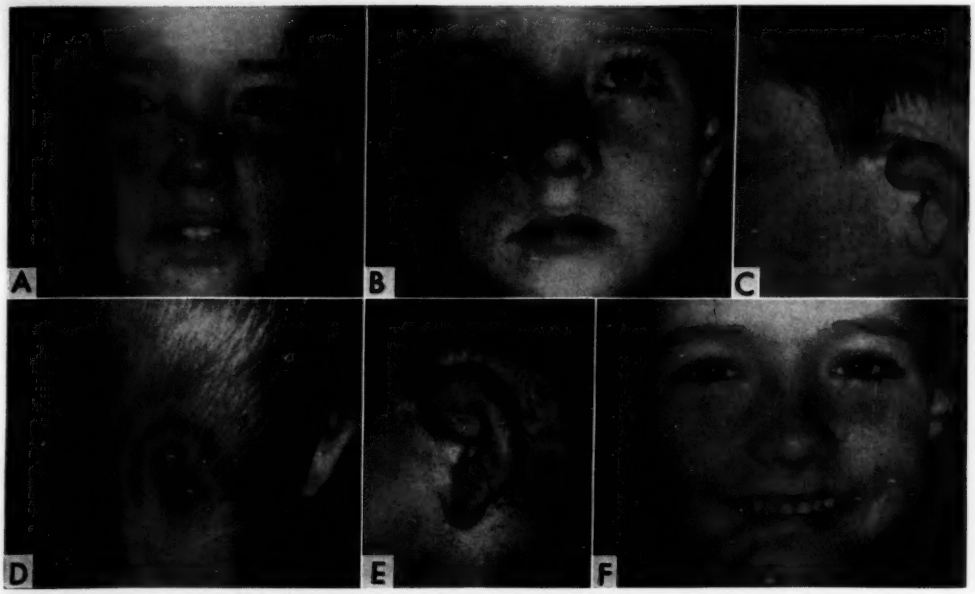

Fig. 4.—*A*, left ear at an intermediate stage of construction with knee meniscus (fibrocartilage) as a supporting framework. The ear represented in *B*, *D* and *E* is shown after three operations. Four months later, shrinking, lopping and beginning loss of proper position and detail occurred (*C* and *F*).

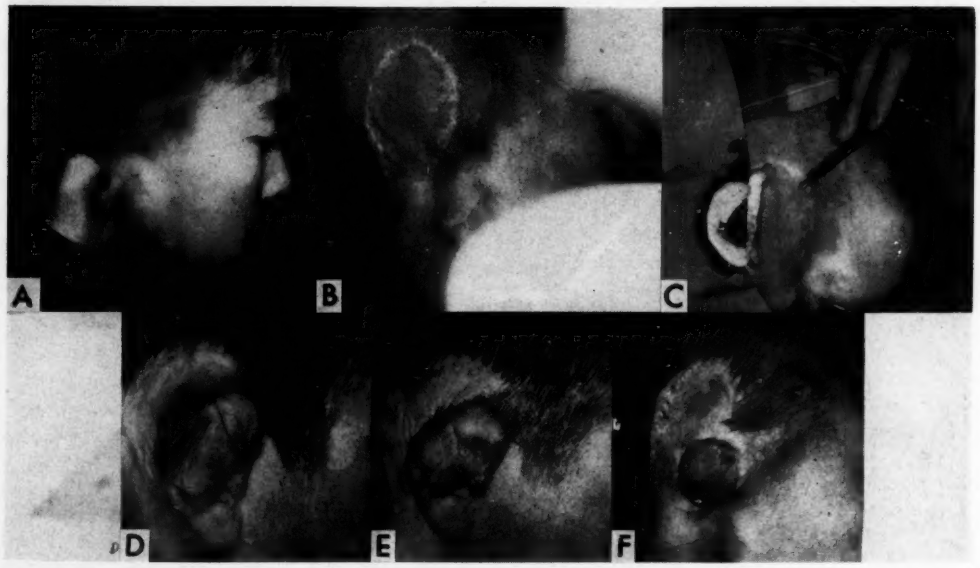

Fig. 5.—*A*, total absence of ear. *B*, hair-bearing area replaced with a full thickness skin graft. *C*, implantation of knee cartilage. *D*, constructed ear with two additional procedures for lobule and additional implant for a superior-anterior helix. *E*, hair-bearing area removed by defatting the hair-bearing skin and replacing it. *F*, appearance six months after total construction, with almost complete loss of size and total loss of form and detail.

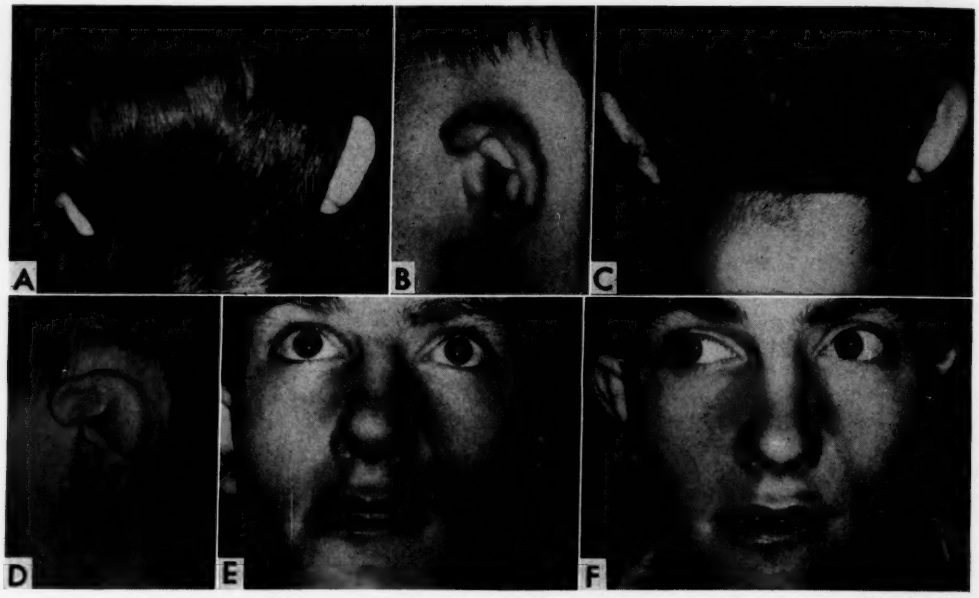

Fig. 6.—*A* and *B*, abnormally placed abortive left ear. D, an intermediate stage of construction. *C* and *F*, reconstructed ear. *E*, appearance six months after construction. There are lopping, shrinkage and loss of detail, expected to be progressive.

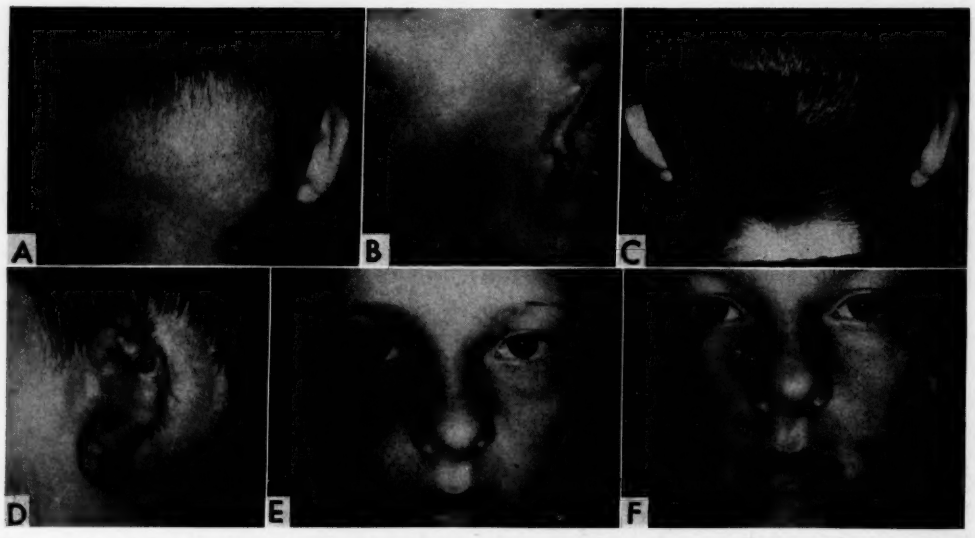

Fig. 7.—*A* and *B*, microtia, left. *D* and *E*, intermediate stages in construction with knee cartilage. Ulcer in *D* resulted from a fall. *C* and *F*, final result.

lized, and subjected to biopsy, and the cephaloauricular angle was filled with a superior and an inferior single pedicle flap. The open area on the ear and mastoid was covered with a thick split-thickness skin graft. At six months abdominal im-

plants previously transferred to the mastoid area were mobilized and subjected to biopsy. At one year, eighteen months and two years, respectively, reconstructed ear cartilage implants were studied by biopsy, and in some cases the total implant was removed.

All surgical procedures in these 12 cases were performed without infection. The ulcer shown in Figure 7*D* resulted from a fall. In no instance was either a fresh or a preserved cartilage implant accompanied by an inflammatory reaction or the accumulation of sterile fluid.

Aqueous merthiolate solution, as described by Pierce and O'Connor and by Brown, was used as a storage medium for the menisci. The specimens were kept at ordinary refrigerator temperatures. The fluid and cartilage samples were cultured at three-week intervals, and at no time were implants used from contaminated stock solutions. Contaminated solutions were observed on 2 occasions, and the material was discarded.

All procedures were done with the patient under general endotracheal anesthesia. Buried No. 5-0 white silk and cutaneous No. 5-0 black silk sutures were used.

Gross Pathologic Observations. — The gross meniscus when obtained is irregular (Fig. 1*A*) but when trimmed appears quite suitable for ear reconstruction (Fig. 1*B*). The gross rim curvature, the pres-

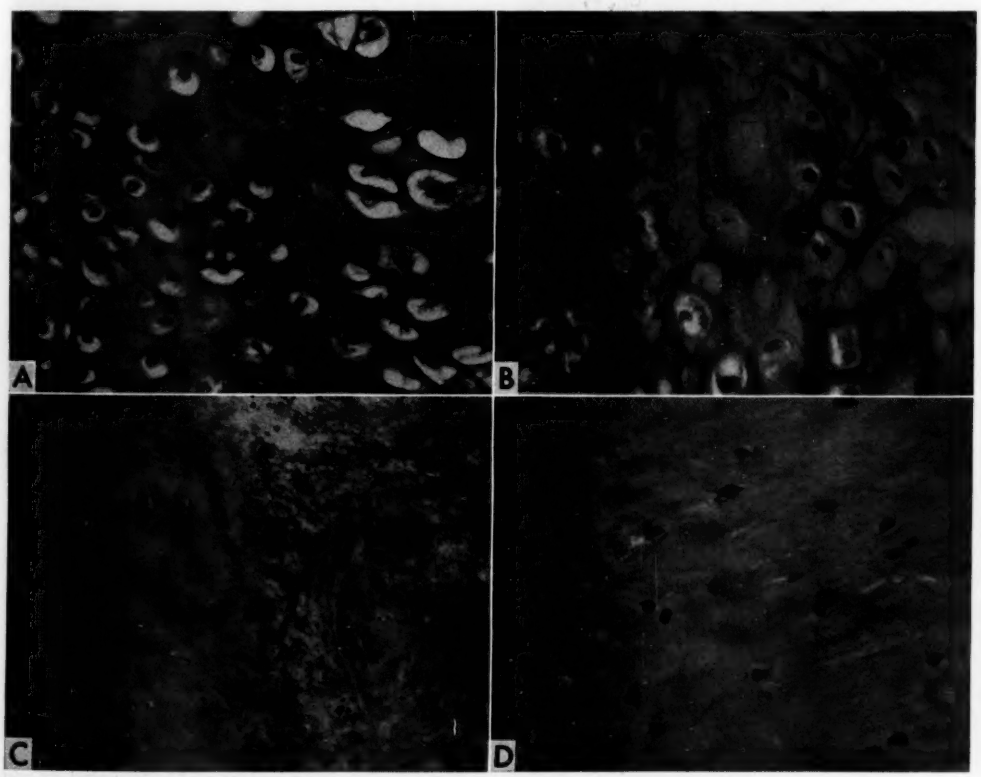

Fig. 8.—*A*, hyaline cartilage. *B*, elastic cartilage. *C* (×9½), fibrocartilage (knee meniscus) with its intercellular collagen bundles, between which are situated rounded and elongated collagen cells. *D* (×30), fibrocartilage with wavy collagen and many cells.

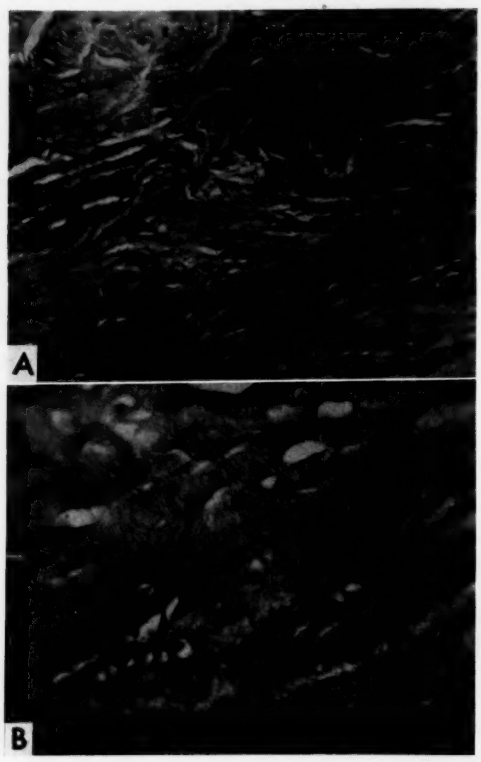

Fig. 9.—*A* (×7½), fibrocartilage after storage in 1:4,000 aqueous merthiolate for eighteen months. *B* (×30), compactness of the collagen bundles is somewhat decreased with an early fibrillary nature associated with some clefts between the collagen bundles. The lacunae appear partially empty, owing to some shrinkage of the cells.

ence of a concave surface and the gross size seem ideal, since all of these features are desired in the ear, with seemingly few alterations. A wide variety of sizes of segments with curvatures suitable to construction of ears either on the right or on the left are readily obtainable (Fig. 2*A*). Storage problems are minimal. While stored the cartilage changes little, if any (Fig. 2*B*). The configuration, size, gross texture and resiliency were unchanged after storage three, six, twelve and eighteen months. Initially the knee cartilages were buried in the abdomen, so that any tissue reaction or change in the cartilage might be observed. Later in the study the cartilages were placed directly into the mastoid area. There has been no infection and no instance of sterile fluid accumulation about the cartilages. The menisci, when removed from the abdomen or the mastoid area, were always without firm union with the adjacent tissue and were encapsulated by a moderately thick fibrous capsule. Cartilages have been left in the abdomen for three months before transfer, and in other instances longer, for observation. At the end of three months there was moderate compression and some loss of detail in form. The cartilages are still adequate for use in ear reconstruction, however, and have been used in 4 instances. In 8 cases the cartilage was placed

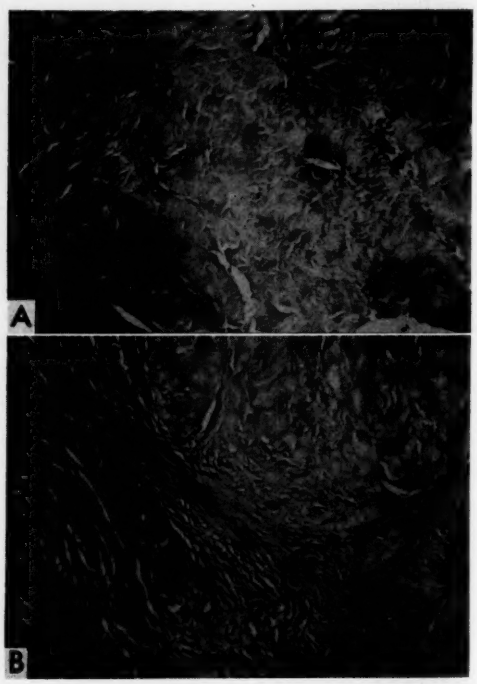

Fig. 10.—*A*, increased vascularity noted in the peripheral one-third. B, foreign body reaction to No. 5-0 white silk, around which most of the increased vascularity occurred.

directly into the mastoid area. In all instances there was progressive shrinkage, loss of form and loss of rigidity as observed at three, six and twelve months (Fig. 3*A*). When cartilages originally of equal size were removed from either the abdomen or the mastoid area at one year or over (3 were removed in two years), there remained only a small globular mass without either form or rigidity (Fig. 3*B*).

Clinical Observations. — The clinical changes were compatible with the gross pathologic alterations. The original form and somewhat rubbery consistency of the constructed ear is encouraging, especially in view of the simplicity of the procedure involved in obtaining and utilizing knee menisci. Figure 4*A* illustrates an early stage in reconstruction of the left ear. After three operations the ear is quite acceptable (Fig. 4, *B*, *D* and *E*). Four months later, however, the ear has lost its support, has lopped, and is shrinking in total size (Fig. 4, *C* and *F*). This discouraging chain of events was seen repeatedly (Fig. 5, *A* and *E*), with shrinkage, noted in some to be almost complete (Fig. 5*F*). Figure 5 represents operative sequence taken on two cases. Subtotal reconstruction affords less opportunity for shrinkage. A segment of rudimentary ear can be rotated to a superior-anterior helix position and a lobule salvaged inferiorly. This leaves a central segment to be built, it being wedged between two more nearly normal sections. Satisfactory ears are obtained by this method (Fig. 6, *C* and *F*), but within four months to one year these also lose their support, their upright relation to the head (Fig. 6*E*), and detail, and the total size decreases greatly. Quite consistently satisfactory ears can be constructed (Fig. 7, *C* and *D*), but they do not last. Shrinkage, lopping and loss of detail were consistent after four to six months.

Microscopic Observations.—For a more satisfactory evaluation of the observations in this study, cartilages were sectioned for

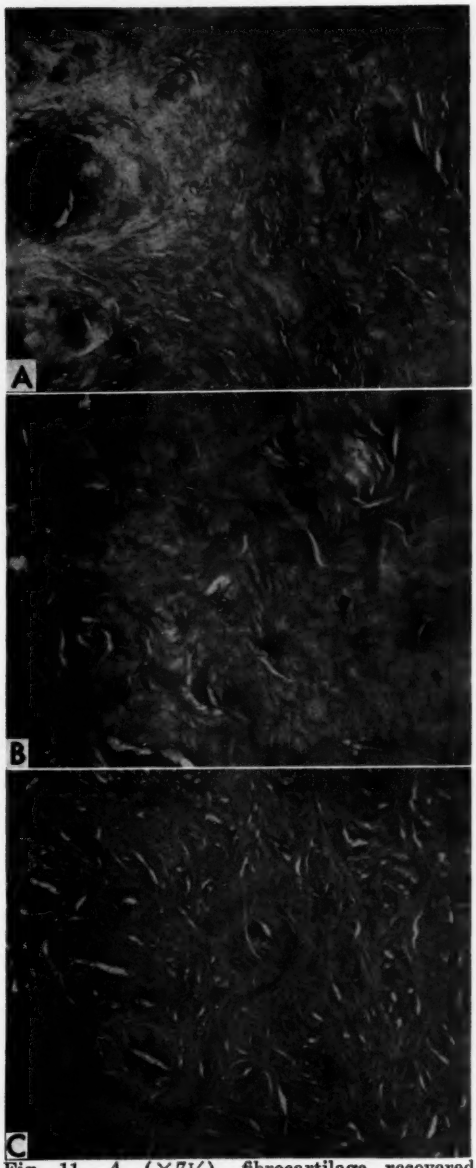

Fig. 11.—*A* (×7½), fibrocartilage recovered from mastoid area after four months. Note decrease in compact collagen bundles and collagen cells, increase in loose fibrillary character of intercellular material, multiple clefts in intercellular substance and beginning areas of hyalinization and smudging. *B*, same specimen, ×30. *C* (×7½), cartilage removed from abdomen after four months. Changes are similar to those in cartilage removed from mastoid after equal time (*A* and *B*).

Fig. 12 (×7½).—Fibrocartilage recovered from the mastoid after six months. There is loss of the collagen bundle structure, with numerous clefts. Note the hyalinization and smudging in the lower left corner and the general absence of cartilage cells.

microscopic study. All tissues were stained with hematoxylin-eosin stains. The observations made by a pathologist who did not know the purpose or sequence of the slide studies are presented. His data support the clinical and gross pathologic observations.

Comparison of basic cartilage types was made in establishing the knee meniscus as a fibrocartilage of basic mesenchymal cell (connective tissue cell) origin. Hyaline cartilage from the rib, with its homogenous matrix, elastic cartilage from the ear, with its identifying fibrillary (elastic) stroma, and fibrocartilage from the knee meniscus are illustrated (Fig. 8, *A* and *D*). High-powered and low-powered photomicrographs of sections of the fibrocartilage demonstrate the typical intercellular substance of collagen bundles, between which are situated rounded and elongated collagen cells. Contrary to Vidaurre's report, there is no pericondrium on fibrocartilage.[14] This tissue represents a transition between connective tissue and hyaline cartilage. Many plump cells fill their lacunae in sections of fresh knee cartilage. Menisci stored in aqueous merthiolate and maintained as sterile specimens in an ordinary refrigerator present no gross and few microscopic changes. There occurred, however, some shrinking of the previously plump cells, leaving the lacunae partially empty (Fig. 9*A*). Also, there was some decrease in the compactness of the collagen bundles, and a few clefts developed between some of these bundles (Fig. 9*B*). The changes were identical when these cartilages were placed in the abdominal wall and transferred to the mastoid area, left in the abdominal wall, or placed in the mastoid area originally and left there for equal periods. In sections made after implantation for one to two months, increased vascularity can be noted, especially in the peripheral one-third of the specimen (Fig. 10*A*). This would seem to indicate increased viability, even though one sees no intimate relation grossly between the host and the implant to suggest this. Much of this vascular change remains peripherally located and in many instances is intimately related to areas of foreign body reaction to silk (Fig. 10*B*). At this point, two months after implantation, the clinical observations, seemingly insignificant gross cartilaginous changes, and a possible indication of host acceptance (reflected in improved circulation) all stimulated encouragement soon to be thwarted. Between two and four months the collagen bundles lost detail, became distinctly fibrillary (Fig. 11, *A* and *B*) and were separated by numerous clefts (Fig. 11, *A* and *C*). The cartilage cells were fewer, and many lacunae were empty (Fig. 11, *A*, *B* and *C*). The increased vascularity became less evident, and many areas of collagen degeneration and wide areas of smudging appeared (Fig. 11*A*). Sections made of cartilage removed from the mastoid and completed ears (Fig. 11, *A* and *B*) are similar to those of cartilage removed from the abdomen after an equal time of implantation (Fig. 11*C*). Six months after implantation these changes were even

more marked, and by then or within one or two additional months the microscopic picture paralleled the gross pathologic shrinkage, loss of detail and form and the clinical failures. Microscopically one noted a fibrillary tendency in the formerly compact collagen bundles, and there were numerous clefts in the intercellular structure. Cartilage cells were absent or only rarely seen, and the lacunae were empty. Large areas of smudging were noted, and the tissue persisted only as a hyalinized, nonvascular mass surrounded by a fibrous capsule. (Fig. 12).

SUMMARY AND CONCLUSIONS

In the total or subtotal construction of ears homogenous knee menisci, as a framework, have given initial results. Mir y Mir is enthusiastic about these fibrocartilages, as was I early in this study. Mir y Mir's work is substantiated in that the cartilage cells die. His observations — persistent gross size, clinical elasticity and resiliency and lack of microscopic evidence of degeneration of the collagen bundles — are not substantiated by this study. Fibrocartilage (connective tissue of primitive mesenchymal origin) is not invaded by fibroblasts but is encapsulated. Possibly there is some conversion to the primitive connective tissue cell. Observations during this study would indicate degeneration and hyalinization of the collagen bundles, with total loss of form and size.

It is possible that autogenous knee cartilages would be more serviceable in many respects than are homogenous menisci. It is hoped that a study of this possibility can be reported on in the future. One would hesitate, however, to risk injury to a normal knee in this search for a better material for reconstruction of the ear.

In conclusion, it can be stated that the early enthusiasm for homogenous menisci (fibrocartilage) for total and subtotal ear reconstruction is not supported by further observation. True, the cartilages are readily available and are easily and safely stored, and there is little change in them after storage for one year. After their implantation into the abdominal wall or mastoid area, however, there is loss of gross form and size. Microscopically there is loss of the cartilage cells, and fibrillary disruption of the collagen bundle occurs, with consequent smudging and hyalinization. These changes are clinically evinced by shrinking, lopping and loss of form in reconstructed ears that initially were satisfactory. Degenerative changes are evident about two months after implantation and are complete in six to nine months.

ZUSAMMENFASSUNG

Der arteigene Meniskus des Kniegelenks ergibt als Gerüst beim völligen oder teilweisen Wiederaufbau der Ohrmuschel anfängliche Erfolge. Im frühen Stadium meiner Untersuchungen habe ich die Begeisterung von Mir y Mir über diese Faserknorpel geteilt. Ich kann die Arbeit von Mir y Mir insofern bestätigen, als die Knorpelzellen zugrunde gehen. Seine Beobachtungen jedoch, dass die kollagenen Bündel ihre Grösse, Elastizität und Federung beibehalten und mikroskopisch keine Degenerationserscheinungen aufweisen, werden durch meine Untersuchung nicht gestützt. Faserknorpel (Bindegewebe, das vom primitiven Mesenchym abstammt) wird nicht von Fibroblasten durchdrungen, sondern wird eingekapselt. Möglicherweise kommt es zu einer Umwandlung zur primitiven Bindegewebszelle. Die Beobachtungen während meiner Untersuchung weisen auf eine Degeneration und Hyalinisierung der kollagenen Bündel mit völligem Verlust ihrer Gestalt und Grösse hin.

Es ist möglich, dass der autogene Knorpel des Kniegelenksmeniskus in vieler Hin-

sicht geeigneter ist als der homogene Knorpel, und es besteht die Hoffnung, dass darüber später berichtet werden kann. Es ist jedoch schwierig, die Schädigung eines gesunden Knies zu riskieren, um ein geeigneteres Material zur Wiederherstellung des Ohres zu finden.

Zusammenfassend lässt sich sagen, dass die erste Begeisterung für den homogenen Meniskus (Faserknorpel) zur völligen oder teilweisen Wiederherstellung des Ohres sich durch weiter Beobachtungen nicht rechtfertigen lässt. Es stimmt, dass diese Knorpel leicht erhältlich und konservierbar sind und nach einjähriger Aufbewahrung kaum irgendwelche Veränderungen aufweisen. Nach ihrer Einpflanzung in die Bauchwand oder in die Gegend des Proc. mastoideus jedoch büssen sie an Grösse und Form ein. Mikroskopisch erkennt man den Verlust von Knorpelzellen und fibrilläre Unterbrechung der kollagenen Bündel mit anschliessender Auflösung und Hyalinisierung. Klinisch äussern sich diese Veränderungen als Schrumpfung, Zusammenfall und Formverlust des operierten Ohres, das im Anfang zufriedenstellend aussah. Die degenerativen Zustände treten etwa zwei Monate nach der Implantation ein und erreichen ihren Höhepunkt innerhalb von sechs bis neun Monaten.

RIASSUNTO

Per la ricostruzione delle orecchie è stato impiegato un trapianto omologo di menisco prelevato dal ginocchio, e l'Autore, assieme a MIR y MIR, se ne è dimostrato, all'inizio, entusiasta. Secondo MIR de cellule cartilaginee morirebbero, ma lo studio condotto dall'autore ha potuto dimostrare alterazioni cellulari e degenerazione dei fasci collageni. La fibrocartilagine (tessuto di origine mesenchimale) non è invasa dai fibroblasti ma viene incapsulata e forse vi è una trasformazione verso cellule di tipo connettivale. Altre osservazioni hanno dimostrato degenerazione e ialinizzazione dei fasci collageni con scomparsa totale della forma e delle dimensioni primitive.

Forse trapianti cartilaginei autologhi potrebbero ssere più opportuni di quelli omologhi, e ci si augura che in futuro si facciano dei tentativi in questo senso, senza però trascurare il rischio di ledere un ginocchio sano nel tentativo di riparare un orecchio.

In conclusione si deve dire che i primitivi entusiasmi non sono stati confermati dalle successive esperienze. E' vero che le cartilagini sono facili da procurare e da conservare e che non si modificano anche dopo un anno di conservazione, ma dopo il loro trapianto nella parete addominale o nella regione mastoidea esse perdono il loro aspetto e le loro dimensioni, le cellule cartilaginee scompaiono, i fasci collageni si frammentano con successiva ialinizzazione. Queste modificazioni si traducono clinicamente in una perdita di forma dell-'orecchio ricostruito, dopo un periodo iniziale in cui il risultato sembrava soddisfacente. Le alterazioni sono già evidenti dopo un mese dal trapianto e si completano dopo 6-9 mesi.

RÉSUMÉ

Dans la réconstruction totale ou presque totale des oreilles l'usage des ménisques du genou homogènes pour support a donné des résultats favorables initialément. Mir y Mir sont enthousiastiques de ces fibrocartilages, comme j'étais moi meme au commencement de mes essays. L'Oeuvre de Mir y Mir est basé sur le principe que les cellules du cartilage meurent. Leur observations de persistence du greffon en grandeur et élasticité et de l'absence d'éviden ce microscopique de dégénération des fibres collagéneuses ne sont pas confirmées par ces études. Fibrocartilage (tissu fibrocellul aire d'origine primitive mesenchymal) n'est pas pénétré par les fibroblastes mais il est encapsulé. Il y a peut-etre une

espèce de conversion en cellules connectives primitives. L'observation pendant cette étude indique plutôt une dégénération et hyalinisation des fibres collagéneuses avec perte totale de forme et volume. Il est possible que le cartilage autogène du genou donnerait souvent de meilleurs résultats que les menisques homogènes. On espère, qu'une étude de cette possibilité peut être reportée au futur. Tout de même on hesiterait de risquer une lésion d'un genou normal en cherchant un meilleur matériel pour la réconstruction d'une oreille.

En résumant il faut constater, que l'enthousiasme précoce pour les méniques homogènes (fibrocartilage) pour la réconstruction totale ou presque totale des oreilles n'est pas confirmé par les observations continues. C'est vrai, que les cartilages peuvent être obtenus facilement et conservés surement et qu'ils changent peu après avoir été c o n s e r v é s pendant une année. Mais après leur implantation dans le paroi abdominale ou la région mastoide ils perdent leur forme et volume. Microscopiquement les cellules cartilagineuses périssent, les fibres et les faisseaux fibrillaires déchirent, suivi par s o u i l l u r e et hyalinisation. Cliniquement des oreilles reconstruites, qui d'abord paraissaient satisfaisantes, *retréfissent* perdent en volume forme et consistence. Les changements dégénératifs sont évidents a peu près deux mois après l'implantation et sont complets apres six a neuf mois.

RESUMEN

En la construcción total o subtotal de las orejas el menisco homogéneo de la rodilla ha proporcionado sus resultados iniciales. Al empezar este estudio me encontraba entusiasta al igual que Mir y Mir, quienes d e m o s t r a r o n en su trabajo la muerte de las células cartilaginosas del disco. En nuestro estudio no se comprobaron las observaciones de la conservación del tamaño elasticidad clínica y falta de evidencia microscópica de degeneración de los haces colágenos. El fibrocartílago (tejido conjuntivo de origen mesenquimatoso) no es invadido por los fibroblastos pero es encapsulado. Posiblemente se presenta alguna conversión a la célula primitiva conjuntiva. La observación de estudio podría indicar la degeneración y la hialinización de los haces colágenos, con la perdida total de la forma.

Es posible que los cartílagos autógenos podrían ser muy útiles. Se tiene la esperanza de que el estudio de esta posibilidad pueda ser comunicada en el futuro. Sin embargo, se duda acerca del riesgo de la producción de una lesión en una rodilla normal en la búsqueda por un material mejor para ser usado en la reconstrucción de la oreja.

En conclusión se puede decir que el entusiamso precoz por los meniscos homogéneos (fibrocartílagos) para la reconstrucción p a r c i a l o total de las o r e j a s no apoyado por las últimas observaciónes. Verdaderamente los cartílagos pueden obtenerse facilmente y no ocurren cambios en ellos al ser almacenados hasta por un año. Sin embargo, cuando se trasplantan a la pared abdominal, o al área mastoidea, pierden su apariencia y forma. Microscópicamente se demuestra una pérdida de células cartilaginosas y se produce una perturbación de los haces de colágeno con la hialinización consiguiente. Estos cambios se demuestran clínicamente por un acortamiento y perdida de la forma en las orejas reconstruídas que al principio aparecían satisfactorias. Los cambios degenerativos son evidentes a los dos meses después de la implantación y son completos en un plazo de seis a nueve meses.

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One of the most powerful sources of false belief is envy. In any small town you will find, if you question the comparatively well-to-do, that they all exaggerate their neighbors' incomes, which gives them an opportunity to justify an accusation of meanness. The jealousies of women are proverbial among men, but in any large office you will find exactly the same kind of jealousy among male officials. When one of them secures promotion the others will say: "Humph! So-and-so knows how to make up to the big men. I could have risen quite as fast as he has if I had chosen to debase myself by using the sycophantic arts of which he is not ashamed. No doubt his work has a flashy brilliance, but it lacks solidity, and sooner or later the authorities will find out their mistake." So all the mediocre men will say if a really able man is allowed to rise as fast as his abilities deserve, and that is why there is a tendency to adopt the rule of seniority, which, since it has nothing to do with merit, does not give rise to the same envious discontent.

—*Russell*

Amputation Neuroma of the Anus

Report of a Case

MARK M. MARKS, M.D., F.I.C.S.

KANSAS CITY, MISSOURI

AMPUTATION neuromas have been described as occurring in a variety of organs that have undergone surgical treatment. Some difference of opinion exists as to whether these benign proliferations of nerve and supporting tissue are true tumors. Recent tests classify these lesions with tumors of nerve and of the neurodermal supporting structure of nerves.[1] The extremities[2] are the most common sites for such growths, but they have also been found in the oral cavity and mentioned as a cause of obstruction in the bile duct following gallbladder operations.[3] Josephsson claims that these benign tumors may occur in any nerve where continuity has been partially or totally interrupted. Chauvel[4] found them in 81 per cent of all amputation stumps over 50 years old.

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Section of specimen.

Considering the number of patients who have undergone anorectal operations, it is surprising that amputation neuromas have not been reported as occurring in this highly sensitive area. Because of their apparent rarity, the following case is presented.

REPORT OF CASE

Mr. H. P., aged 58, was examined because of pain on defecation. This symptom had been slowly increasing in severity since a rectal operation seven years prior to examination. There were no other complaints referable to his digestive tract.

The anal outlet was well healed, with minimal scarring, and was adequate in size. There was some reformation of anal varices, but these were not symptomatic. On the right lateral posterior quadrant of the mucocutaneous juncture a nodule the size of a match head was observed. When this was manipulated it produced the typical discomfort, ac-

cording to the patient. Low spinal anesthesia was induced, and this nodule, the anal varices and several enlarged crypts were removed. Postoperative healing was uninterrupted, and there was no return of the pain after a full year.

Microscopic examination of the nodule (see illustration) was reported as follows:

"A section of the specimen submitted as a granuloma shows it to be covered on its external surface by a continuous layer of stratified squamous epithelium, in which no unusual changes are noted. A large portion of the stroma of the specimen, extending to the deep line of resection, is occupied by a well-defined unencapsulated nodule composed largely of bundles of fibrillous tissue having the appearance of nerve fibers, the majority of which are present in the form of well-defined small bundles separated by thin fibrous connective tissue bands. The majority of the nerve fibers in the section appear in cross section. Throughout the nodule are a number of blood vessels of small caliber, frequently in intimate relation to the nerve fibers. A fair number of dilated, congested, thin-walled, small and medium-caliber blood vessels lie in the stromal tissue between the covering squamous epithelium and the superficial aspect of the nodule. Diagnosis: Neuroma (amputation type) of anal tissue."

SUMMARY

A benign tumor of the anus is described as an amputation neuroma following anorectal surgery.

ZUSAMMENFASSUNG

Es wird eine gutartige Geschwulst des Afters beschrieben, die sich als ein nach einer anorektalen Operation entstandenes Amputationsneurom herausstellte.

RIASSUNTO

Viene descritto un neuroma benigno dell'ano consecutivo ad intervento anorettale e considerato come neuroma da amputazione.

RÉSUMÉ

Un tumeur bénigne est décrit comme neurome d'amputation suivant une opération ano-rectale.

RESUMEN

Se describe un tumor benigno del ano como un neuroma consecutivo a una operación anorectal.

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That man is never happy for the present, is so true that all his relief from unhappiness is forgetting himself for a little while. . . Happiness is not found in self-contemplation, it is perceived only when it is reflected from another.

—*Johnson*

Pedunculated Fibroma and Leiomyoma of the Lung

NIHAD DORKEN, M.D., F.I.C.S.

ISTANBUL, TURKEY

WITH the exception of chondroma, which is common enough, fibroma and leiomyoma of the lung are extremely rare benign tumors. Yet Graham and Vormack have expressed the opinion that benign tumors of the lung must always be considered potentially malignant. One of Lyssenkin's cases, in which a fibroma of the lung developed into a malignant xanthomatous fibrosarcoma, supports their theory.

The clinical signs of benign tumor of the lung are not particularly startling. The growth arouses attention only after it has attained great dimensions, giving rise to pain, disturbances of the pulmonary circulation, dyspnea or osteoarthropathic change. The tumor may also impede the drainage of the bronchi, provoking pulmonary disturbances or secondary bronchiectasis. Thoracic pain, mediastinal compression and deviation of the esophagus are all late signs, indicating that the tumor has grown extensively. Small tumors are discovered only at autopsy or through a chance roentgenogram. In fact, the tumor in my own first case was discovered in the

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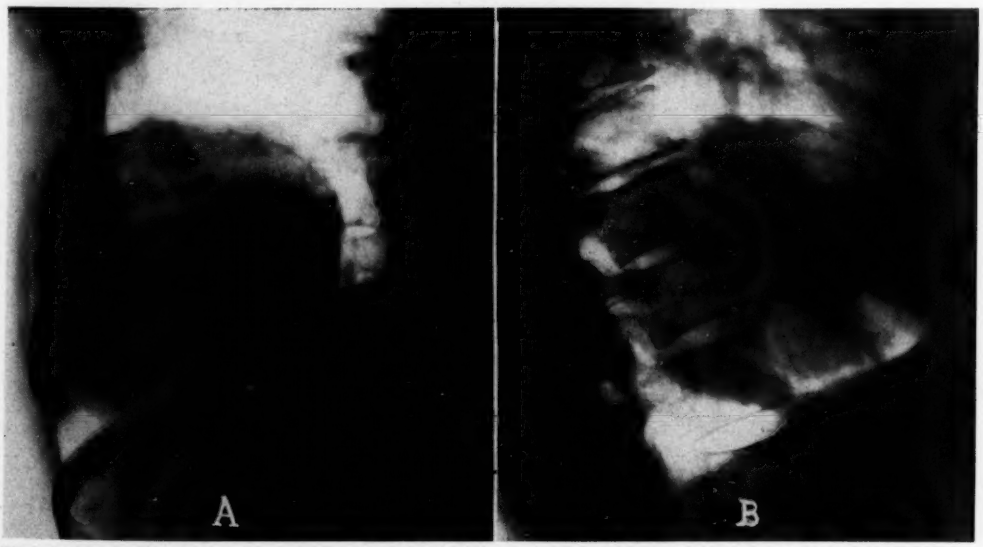

Fig. 1 *(Case 1)*.—Roentgenograms of patient with pedunculated fibroma of the lung. *A*, roentgenogram showing homogenous opaque area at the base of the right lung. *B*, lateral view showing this mass with its outline almost complete.

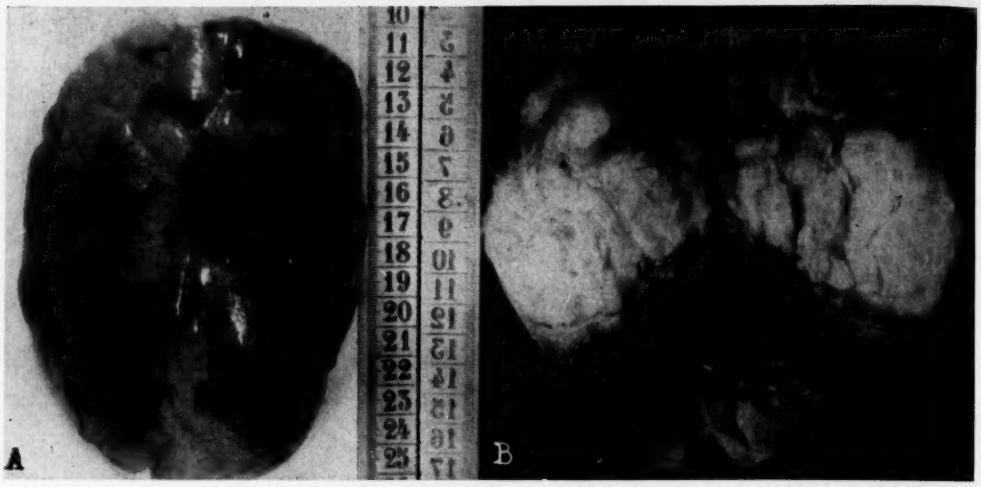

Fig. 2 *(Case 1).—A,* resected specimen, including paracardiac segment. *B,* photograph showing resemblance of specimen to a pulmonary lobe.

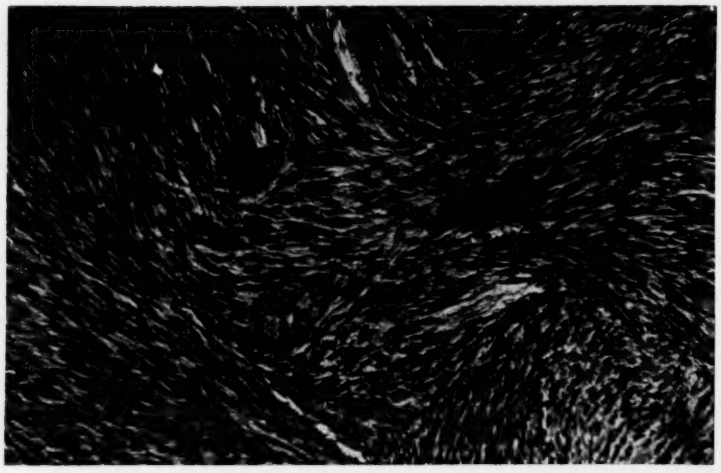

Fig. 3 *(Case 1).*—Histologic appearance of tumor (see text).

latter. It is usually impossible to diagnose the growth with any exactitude before operation is performed.

CASE 1 (*Pedunculated Fibroma of the Lung*).—A. S., a fisherman aged 60, was admitted to the clinic on March 11, 1953. He presented no pulmonary abnormalities, but he complained of epigastric pain, associated with vomiting, of thirty years' duration. He proved to have a duodenal ulcer. Some days prior to his hospitalization a routine radioscopic study made before the passage of a gastric tube revealed a round opaque area at the base of the right lung. (Fig. 1*A*). The personal and family history revealed no abnormality. The patient was well nourished and in good general condition, both physically and mentally. Turgor was normal.

Clinical examination revealed tenderness in the epigastric region. No other abnormality was encountered.

The thorax was symmetric. The respiratory movements were equal on the two sides.

Fig. 4 *(Case 2).—A*, and *B*, roentgenograms showing large mass entirely filling the upper part of the left lung. *C*, film showing displacement of trachea and esophagus by tumor. *D*, upper left bronchus flattened by tumor.

Slight dullness in an area as large as the palm of a hand was observed at the right middle axillary line between the fifth and sixth intercostal spaces. Thoracic vibration was diminished on the right. The vesicular murmur at the base of the right lung was reduced.

The red blood count was 3,500,000 per cubic millimeter, with 60 per cent hemoglobin. The white blood cells numbered 6,250 per cubic millimeter, with a differential count of 66 per cent neutrophils, 29 per cent lymphocytes, 1 per cent monophils and 4 per cent eosinophils. The sedimentation rate in the first hour was 33 mm. in the second hour 66 mm. The blood was of the B group, Rh negative. The urine was normal. The Casoni and Weinberg reactions were negative. The vital capacity was 4,000 cc.

Roentgen study revealed a duodenal ulcer. A thoracic film showed a homogenous opaque area the size of a large orange at the base of the right lung. It was regularly outlined, and mobile during respiration. As in cases of hydatid cyst, ellipsoid movements appeared with each respiration during the radioscopic study, giving the impression, indeed, that a hydatid cyst was present. A lateral roentgenogram (Fig. 1*B*) showed this mass with its outline almost complete.

Clinical and roentgen signs led to the diagnosis of hydatid cyst. In Turkey this entity occurs frequently, and the Casoni and Weinberg reactions are often negative even when the diagnosis has been otherwise confirmed.

On March 18, with the patient under intubation narcosis and after resection of the right eighth rib through a posterolateral incision, I opened the pleural cavity. No pulmonary adhesions were observed. Widening the cavity with a retractor disclosed an orange-sized mass covered with parietal pleura, moving simultaneously with respiration and attached to the paracardiac segment by a pedicle 4 cm. long. The consistency of the mass was that of fibroma. The pedicle made it possible to remove the tumor through the incision. It was then resected, together with the paracardiac segment (Fig. 2*A*). The lung being otherwise normal, the thoracic wall was closed without drainage.

The pedicle between the tumor and the paracardiac segment was richly vascularized. The tumor itself measured 7 by 12 by 7 cm. It had some resemblance to a pulmonary lobe, showing an even surface with hemorrhages here and there (Fig. 2*B*). There was also two anthracotic points on the surface. The mass

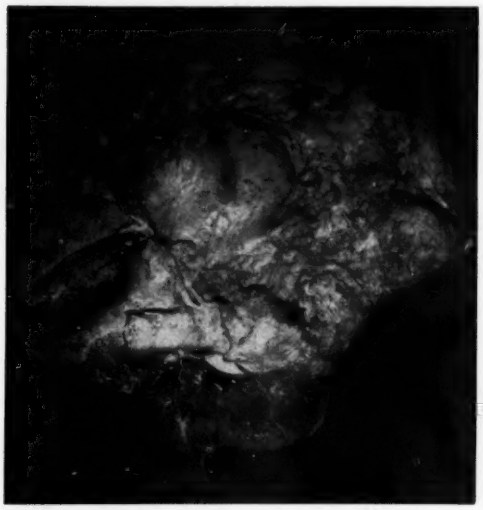

Fig. 5 (*Case 2*).—Tumor excised at autopsy.

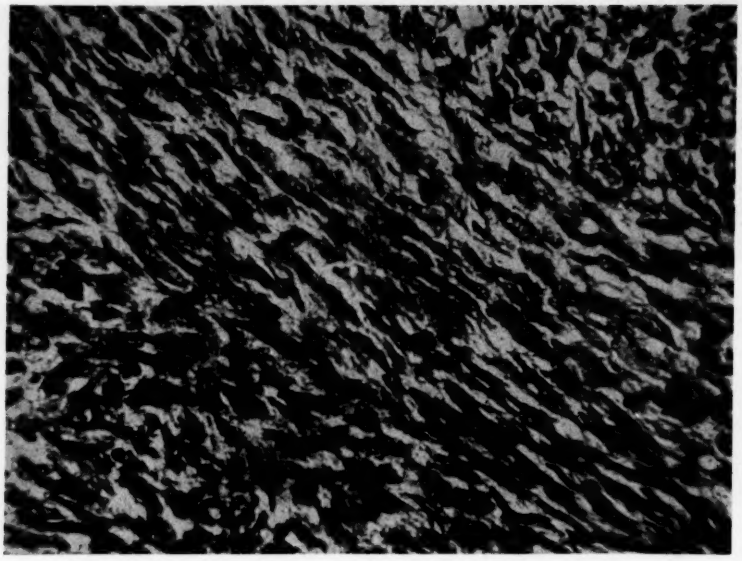

Fig. 6 (*Case 2*).—Histologic appearance of tumor (see text).

was hard and appeared fibrous, and it was surrounded by a soft reddish mass presenting many lentil-sized hard whitish foci. The reddish mass was without definite outline.

Examination of many histologic slides failed to show anything resembling a bronchus, a bronchiolus or an alveola. Anthracotic areas were likewise absent. The mass was composed of collagenous fibers and paratypical conjunctival tissue rich in nuclei (Fig. 3). Large hemorrhages were visible here and there, as well as loose conjunctival tissue infiltrated with erythrocytes. Some parts consisted of bundles of hyaline conjunctival tissue. In the necrotized parts, thrombosed vessels were present. In slides stained with Van Giesen's dye all the fibrotic tissue appeared red. The histologic diagnosis was pulmonary fibroma, large, partly necrotized and partly cicatrized, with a subpleural pedicle.

CASE 2 (*Giant Leiomyoma of the Lung*).—H. A., a man aged 31, came to the hospital on Nov. 3, 1953, complaining of pain in the left side of the back, pain on coughing, dyspnea, and emaciation. The disease had begun two months earlier, with violent pain in the left scapular region. The pain was occasionally accompanied by coughing, with expectoration of odorless and bloodless sputum. The temperature never rose above normal. Later the dyspnea was accompanied by dysphagia. No relevent data were obtainable from the personal and family history of the patient.

The patient was psychically normal. The bone formation, the subconjunctival adipose tissue and the tonus were normal. Clinical examination revealed the left hemithorax more definitely arched than the right. Its wall showed venous proliferation without venous engorgement over the neck. On percussion, dullness was elicited, extending downward 2 fingerbreadths beneath the mammillary line. The ventricular murmur was attenuated in the same region. The right hemithorax and the other organs were normal.

Roentgen examination (Fig. 4, *A* and *B*) revealed a large homogenous mass with a regular outline entirely filling the upper part of the left lung. The esophagus and trachea were displaced and narrowed (Fig. 4*C*). A tomogram showed that the mass was visible on every layer, passed the mediastinum to the right and projected over the base of the heart. The tumor showed no excavation.

Bronchoscopic study revealed no bronchial lesion, but it could be seen that the upper left bronchus was completely flattened by the tumor (Fig. 4*D*).

The erythrocyte count was 3,900,000 per cubic millimeter of blood, with 85 per cent hemoglobin; the leukocyte count was 4800 per cubic millimeter, with a differential count

of 43 per cent neutrophils, 3 per cent stab cells, 10 per cent lymphocytes and 2 per cent monocytes. The icteric index was 1.1. The sedimentation rate at the end of the first hour was 7 mm.; at the end of the second hour, 23 mm. Casoni's reaction was positive; the Wassermann and Kahn reactions, negative. The vital capacity was 2,300 cc. Koch's bacillus was not present in the sputum.

A diagnosis of giant hydatid cyst at the apex of the left lung was made, and operation was performed on December 4. After making a Crawford incision, I dissected the skin and the muscles, resected the fifth rib posterolaterally and cut the posterior part of the fourth rib, thus arriving at the pleura. The last-mentioned tissue presented complete symphysis, and there was great difficulty in placing the automatic retractor. Exploration of the lung revealed a tumor the size of an adult head, covering the apex and the lingula and infiltrating the tissues as far as the mediastinum. Parietal adhesions were dissected with difficulty, but is was impossible to liberate the parts adjacent to the mediastinum, because of their adhesions to mediastinal elements. The tumor could not be separated from the arcus aortae and the other surrounding structures, and it was therefore considered inoperable. The surgical diagnosis was pulmonary sarcoma. The operation was concluded after resection of a large segment of the tumor for biopsy.

Histologic examination revealed the mass to be a leiomyoma. Nevertheless, because of its infiltration of surrounding tissues, it was my opinion that malignancy existed, even though evidence of it was not visible on the histologic slides.

The patient died forty-five minutes after the operation from tracheal compression. Figure 5 shows the tumor excised at autopsy. It was observed to have originated in the upper lobe of the left lung and to have adhered firmly to the neurovascular elements of the mediastinum, to the trachea and to the esophagus. None of the histologic slides revealed evidence of malignancy; the tumor, therefore, must be recorded as a typical leiomyoma (Fig. 6).

SUMMARY

Primary fibroma and leiomyoma of the lung are exceedingly rare benign tumors. Up to 1950 the literature contained only 5 cases of pulmonary leiomyoma. In all but Pilot's case the diagnosis was confirmed at necropsy. In spite of the benign structure of these tumors, infiltration of surrounding organs is characteristic of leiomyoma. Adhesions sometimes prevent their removal, as in the case reported in this article (Case 2).

In no case of pulmonary fibroma recorded in the literature was there a tumor with a pedicle as long as that observed in the author's case (Case 1).

ZUSAMMENFASSUNG

Primäre Fibrome und Leiomyome der Lunge gehören zu den ausserordentlich seltenen gutartigen Geschwülsten. Bis zum Jahre 1950 weist das Schrifttum nur fünf Fälle von Leiomyom der Lunge auf. Mit Ausnahme eines Falles von Pilot wurde die Diagnose jedesmal durch die Nekropsie sichergestellt. Es ist charakteristisch für das Leiomyom, dass es trotz seiner benignen Struktur in die umgebenden Organe eindringt. Verwachsungen verhindern manchmal ihre Resektion, was auch bei dem in dieser Arbeit beschriebenen Kranken der Fall war.

In keinem der in der Literatur aufgefundenen Fälle wird über einen so langen Stiel der Geschwulst berichtet wie im vorliegenden Fall beobachtet wurde.

RÉSUMÉ

Le fibrome primaire et le leiomyome du poumon sont des tumeurs extrèmement rares et bénignes. Jusqu'en 1950 il y avait seulement 5 cas de leiomyome des poumons dans la littérature. A l'exception du cas de Pilet la diagnose de touts les cas fut confirmée par l'autopsie. Malgré sa structure bénigne l'invasion des organes voisines est characteristique pour le leiomyome. Quelque fois des adhésions empèchent leur excision, comme c'était dans le cas de notre malade.

Pas un seul cas des fibromes pulmonaires dans la litterature présenta un pédicule aussi long que celui de notre malade.

RIASSUNTO

Il fibromioma e il leiomioma primitivi del polmone sono tumori benigni di assai rara constatazione. Fino al 1950 nella letteratura vi erano solo 5 casi di leiomioma del polmone, a diagnosi confermata dall'autopsia (tranne quello di Pilot). Questo tumore, per quanto abbia struttura benigna, è caratterizzato dall'infiltrazione dei tessuti circostanti. Le aderenze che così si formano possono, come nel caso presentato dall'autore, ostacolare l'asportazione chirurgica.

SUMÁRIO

O fibroma e o leiomioma primarios do pulmão pertencem ao grupo dos tumores benignos extremamente raros. Até 1950 a literatura registrava apenas 5 casos de leiomioma do pulmão. Em todos eles, com exceção do caso de Pilot, o diagnostico foi confirmado pela autopsia. A despeito da extrutura benigna destes tumores, a infiltração nos orgaões adjacentes é caracteristica do leiomioma. As aderencias impedem algumas vezes a sua extirpação, como aconteceu no caso do paciente apresentado pelo Autor.

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Fortune sometimes makes use of our faults in order to elevate us; and there are some troublesome people whose merit would be badly rewarded if we were not very glad to purchase their absence.

Whatever distrust we may have of the sincerity of those who converse with us, we always believe that they tell us more truth than they do to others.

We have few faults which are not more excusable than the means we take to conceal them.

—*La Rochefoucauld*

Editorial

John Arderne, Father of English Surgery

IN order to appreciate fully the value and position of Master Johannes de Arderne, one must familiarize oneself with the background of the country and period in which this surgeon lived. Almost nine centuries ago the Normans invaded the British Isles and laid the cornerstone of the nation we know as Modern England. The infant nation matured slowly but soundly, so that three centuries later, with the medieval period in Europe drawing to a close, there appeared in Fourteenth Century England also a transition from a philosophy of asceticism, ecclesiastic authority and scholasticism to one of emphasis on science, skepticism and individualism. An educated man in England at that time was endowed with the new knowledge of the sciences and with teachings imparted by the early universities, yet was aware of, and often influenced by, older beliefs and traditions. The Fourteenth Century occupied a strategic position, being heir to the scientific advances of the preceding centuries and predecessor of revival of art, literature and science known as the Renaissance.

D'Arcy Power, a student of the history of English surgery, states that the King of England in this period still flew the Wessex dragon, the old flag of the Saxons, when he went to battle, and his wounded men were treated as often by charms, spells and herb magic as by clean dressings and primary suture of the bowel. During this century the country became involved in that great war with France, which is commonly known as the Hundred Years' War. Englishmen became as familiar with France, Spain and the Low Countries as they were with their own fields and woodlands. Trade was active, and large quantities of money changed hands constantly. Of all classes, the medical profession perhaps profited most. The plague of Black Death in the middle of the century, followed by a long train of epidemic illnesses, and the advent and use of gunpowder during the war, gave leeches, barbers and surgeons an abundant opportunity to practice. Victories abroad made them sanguine enough to experiment and to improve on old methods. Surgery, perhaps more than medicine, was becoming a science in England when, upon the outbreak of the domestic War of the Roses in the Fifteenth Century, all the advances were lost.

Medical science prior to the Fourteenth Century made little if any progress in England, nor do we meet before this time a single medical writer, with the possible exception of Bacon—and he can hardly be considered a medical author—who distinguished himself in the annals of medicine and surgery in the British Isles. Then, in the midst of Fourteenth-Century England appeared John Arderne, later to be known as the Father of English Surgery. His was the age that produced Chaucer, Wycliffe, Froissart, Petrarch and Guy de

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Chauliac. Autobiographic details preserved with his manuscripts, which were written in Latin and later translated, and a small body of traditional knowledge are the sources of information concerning the first English surgeon. Owing to the fact that few of these manuscripts have been printed, John Arderne has not occupied as prominent a place in the history of medicine as he might have filled.

Apparently he was a member of the family of Arderne, or Arden, and claimed descent from Saxon times, when one of his early ancestors, in imitation of the Normans, assumed a surname. To which branch of the family the surgeon belonged is unknown, as there is no reliable evidence. The date of his birth is clearly established by his own statement in his manuscript *De Cura Oculi*, which states that this treatise was written in his own hand at London in the first year of the reign of King Richard II and in the seventieth year of his age. This places the date of his birth in the year 1307. Of his early professional training little is known. The British *Dictionary of National Biography* says of Arderne, ". . . the first Englishman who displayed much skill in surgery, was a layman, not a doctor of medicine, and practiced in the time of Edward III." It has been asserted by many authors, however, that John Arderne was admitted to the University of Montpellier and that he practiced in France as a military surgeon. If this is true, Arderne attended the finest medical school of his time. Montpellier, situated in southern France, was in touch with Arabic learning and was liberal enough even then to sanction the cultivation of anatomic and surgical science; not within the walls of the university, but in extramural classes, in which, among others, Guy de Chauliac, the greatest surgical figure of the age, took part. Though there is historical doubt as to Arderne's academic medical training he was, by his own statement, a "chirugus inter medicos" —a surgeon among physicians. Could it be that he did graduate with the degree Doctor of Medicine and then took up the practice of surgery? Be that as it may, his manuscripts attest to a fairly good education, for they are written in passable Latin; he quotes freely from the Arabic and the Greek, and shows evidence of having been well read in the available literature of his profession. With regard to practical surgical training, he spent many years in France during his adventurous career as an army surgeon.

Arderne obviously practiced abroad, for in his own manuscript one finds the statement that he tried a remedy "in foreign parts upon one King and two Bishops." No doubt the King referred to by Arderne was John of Gaunt, who was also known as the King of Castile. Arderne did not mention the patient by name because the treatise was written in 1376, at which particular time John of Gaunt was considered the most hated man in Europe. Arderne's precaution was a wise one; it was but five years later when a London mob burned Gaunt's palace and killed his personal physician, merely because he was a trusted and valued friend.

In his manuscripts Arderne reveals not only his familiarity with war wounds but his intimate knowledge of several campaigns of the Hundred Years' War. If we agree with the statement of Hippocrates that "War is the only proper school of the surgeon," there is little doubt that Arderne was well grounded in the art and science of surgery. From his writings it can be deduced that he was probably a surgeon in the military service of Henry Plantagenet, the first Duke of Lancaster, and in this capacity visited Antwerp in 1338. In 1343 he went to Algeria, where gunpowder is said to have been employed for the first time. He was also present at Bergerac in 1345 and at the Battle of Crécy in 1346.

After this historic battle, at the age of 40, he returned to England a successful surgeon with many influential friends. He married and settled with Ellen, his wife, at an estate in Mitcham in Surrey, but within a year his wife died of the Black Death. His place of residence after this tragedy is recorded in an autobiographic notation which reads, "I, John Arderne from the first pestilence that was in the Year of Our Lord 1349 dwelled in Newark in Nottinghamshire unto the Year of Our Lord 1370." It is evident that he had sold his newly purchased estate and moved to Newark, where he would be welcomed by the Duke of Lancaster under whom he had served in France. In a manuscript is a record of his generous practice in Newark, where he describes treating noblemen, knights, priests, merchants, friars and the needy. During his thirty-one years there he established a large surgical practice, and when, in 1370, he went to London, he continued professional practice for six more years with remarkable vigor and success. Subsequently he issued the best known of his treatises on fistula *in ano*, with the prefatory remark that it was "written with my own hand in the year when the strong and war-like Lord [Edward the Black Prince] was taken to God." This event (the death of Edward III) took place in 1376. Thus, Master John Arderne reveals but four definite dates in his manuscripts: the date of his birth, seventy years before the first year of the reign of Richard II in 1377; the date of the Black Death in Newark in 1349; the date of his leaving Newark in 1370, and the date of his *Treatises of Fistula in Ano, Hemorrhoids and Clysters* in 1376. There is no evidence to show that Arderne was living when Henry IV came to the throne in 1399, though a deceptive note in his trea-

Fig. 1.—Facsimile of part of a Latin manuscript by John Arderne in the Surgeon General's Library, Washington, D. C., showing top half of page, slightly reduced (Pennington[17]).

Fig. 2.—A frequently reproduced picture of John Arderne (Power[18]).

tise on fistula reads, "With this medicine was King Henry of England cured of the going out of the lure" (i.e. sloughing of the rectum). This statement was merely a side note written in a different hand into some copies of his manuscript, and crept into the English translations with the passage of time. It may be inferred, therefore, that Arderne lived until the later part of the Fourteenth Century. The date of his death is uncertain, but probably lies somewhere between 1380 and 1390.

More than 60 of Arderne's manuscripts are extant throughout the world. No fewer than 22 are in the British Museum, in the original Latin or in early English translations. Other manuscripts are in Oxford Cambridge and Glasgow. There is a Latin version in Stockholm and a French version in Paris. In the United States, a Latin manuscript volume of the works of Arderne was acquired in 1894 by the Surgeon General's Office. This work, like those in the British Museum, is considered "invariably imperfect." Throughout the past six centuries Arderne's works have been referred to many times, yet only within this century have we had access to full and extensive texts (Sir D'Arcy Power's) containing translations of the Master's work. Power first edited a book in 1910 entitled *Treatises of Fistula in Ano, Hemorrhoids and Clysters, by John Arderne, from an Early Fifteenth Century Manuscript Translation.* His second publication, in 1922, was a translation from a copy of the Stockholm manuscript entitled *De Arte Phisicali et de Cirurgia of Master John Arderne, Surgeon of Newark, dated 1412.* Aside from several commentaries by Englishmen who have read Arderne's manuscripts, John Reed in 1588 presented a translation of the essay *Fistula in Ano,* and in 1886 there appeared in South's "Craft of Surgery" a translation of Arderne's treatise *Of the Manner of the Leech.*

The most recent reference to the technical value of Arderne's works was made by J. R. Pennington in 1923. In his text entitled *A Treatise on the Diseases and Injuries of the Rectum, Anus and Pelvic Colon,* Pennington mentioned the history of proctology with reference to its historical surgical aspect and referred to Arderne as a surgeon much in advance of his time — for today the principle of his therapy for fistula *in ano* is still used. His book includes an illustration of a part of the Latin manuscript of Arderne, now at the Surgeon General's Library (Fig. 1).

Pennington stated that the surgeon's work is original, complete, and detailed, combining well the theory and practice. Riesman has referred to Arderne as the "first proctologist." It is likely that much of his surgical experience was acquired in France, for the rigors of war of that day contributed greatly to the development of ischiorectal abscess and subsequent fistulae. One of the principal conditions that led to fistula formation in members of the nobility was the practice of sitting cold and damp for long hours in the saddle, weighed down by heavy armor. When Arderne later returned to Newark, he developed an extensive practice involving the treatment of this malady. Prior to this time fistula *in ano* was considered incurable and inoperable. The only other person to attempt its surgical treatment was an insignificant retainer of the Black Prince whom Arderne classed as a fraud.

A frequently reproduced picture of Arderne (Fig. 2) is one in which he is probing a fistula *in ano*—with the patient discreetly omitted. The original picture from Arderne's manuscript is more revealing, showing both the surgeon and the patient (Fig. 3). In both versions of the print, Master John Arderne is seen in the long robe of his profession, which distinguished him from the barber surgeons of the time who wore the short robe. Membership in the Guild of Surgeons of London gave one the right to prefix "de" to his surname, and in that manner was derived his title, Magister Johannes de Arderne.

Arderne's description of the technical work for which he is best known is extremely interesting. In writing of the treatment of fistula *in ano*, Arderne considered the influence of the moon in choosing the day for the operation, as was customary at the time. It is a great contrast to find details and opinions regarding his preparation for the surgery. He advises preoperative selection of patients whose skin is "well colored" and who are "good hearted and abiding." They should be taken "to a place made ready," that is, an operating room, where there must be good light upon the operative field. The patient should be placed in a lithotomy position. Furthermore, the surgeon requires an assistant to help him with the procedure. The patient is advised at the time of the operation to be brave and obedient, and the operation is begun.

The operation Arderne described is said to resemble somewhat that recommended by the Arabian physician Albucasis in the Tenth Century. The finger is lubricated and placed into the rectum to determine operability, for if a cancer is present the operation would not be undertaken. The

Fig. 3.—A Master of Surgery (John Arderne) in the act of operating on a fistula *in ano*. Compare Figure 2, in which the portion of the patient's body is not shown (Power[21]).

instruments pictured (Fig. 4) are the crude ones that Arderne used. A probe (*sequere me*) is inserted into the fistula and through the eye of the probe four strands of ligature (*fraenum Caersaris*) are passed. The probe is then removed by way of the rectum, leaving the ligatures pulled through the fistula. The two ends are knotted together and the entire ligature tightened. A dilator (*tendiculum*) is then inserted into the fistula and by means of a peg (*vertile*) fixed to the widest part of the dilator, the ligature is tightened in the way that a string is tightened about a violin peg. A grooved director or snouted needle (*acus rostrata*) is passed along the fistula until it projects into the rectum, and a shield or spoon (*cochlearia*) with a depression at its center is passed through the anus until the grooved director engages in the depressed notch. The spoon protects the surgeon's own finger and also the wall of the rectum, particularly should the patient move. A lancet is then passed along the groove in the director, and the fistula is divided along its entire length by drawing the knife, dilator, grooved director and spoon out of the rectum with a single movement, the ligature coming away at the same time. Arderne specifies that each branch of the fistula must be laid open in the fashion aforedescribed. Bleeding is stopped by pressure with a sponge and the wound dressed clean with styptic powders. Arderne goes even further into detail, describing a T-bandage as being the best to apply after the operation. Postoperatively, the Master Surgeon states, the patient's bowels should not be moved for forty-eight hours, and that after a movement the area should be thoroughly cleansed and dried. When the blood has become well clotted, two or three days after the operation, soothing ointments may be applied, but no caustic substances are advised, though their use was the usual tendency in the treatment of wounds of that day. Clysters or enemas are suggested for nine consecutive days and Arderne states that by the twenty-fourth to the twenty-sixth day healing should be near completion. It is only after this that caustics may be applied. He concludes with the statement that the best sign of a cure is dry dressings. In spite of the unnecessarily complicated surgical technic, Arderne was the first Englishman to advocate a principle of treatment for *fistula in ano* that is used in part even today, the so-called "laying open" of the fistulous tract.

Power's translation of Arderne's *Treatises of Fistula in Ano, Hemorrhoids and Clysters* deals not only with the subjects indicated in the title but with cancer of the rectum, fistula of the extremities, ulcers of the leg, tenesmus, rectal prolapse, powders, oils and waters, and valences. Arderne's description of, and advice concerning, rectal carcinoma are classic, and his original observations have been altered but slightly in view of newer surgical technics. The stress he lays upon examination for "bubo within the lure" (i.e., cancer of the rectum) requires detailed consideration. I venture to suggest that this short treatise found in the fifteenth century manuscript should be required reading for all medical students and physicians, because then the importance of such an examination would be indelibly impressed upon the mind, and subsequently there would be fewer cases of far advanced rectal neoplasia.

A few salient points from Arderne's chapter on cancer of the rectum should be noted. He describes a bubo as "a tumor within the rectum which is of great hardness, but little aching. It is called 'bubo' because like Bubo, an owl, it dwells best in dark places and so this sickness lurks within the rectum in the beginning, but after a period of time it ulcerates and sloughs out." Often it causes incontinence.

The diagnosis is made by inserting the finger into the rectum and if within it is felt a hard thing, such as a stone, sometimes on one side and sometimes on both, which prevents defecation, it is a bubo. The signs of ulceration are pain, aching and sharp, that drives the patient to relieve himself two and three times every hour, and the stools are foul-smelling and streaked with watery blood. To well-meaning though unknowing doctors, as to the patient, this appears to be dysentery. Dysentery, however, is a form of diarrhea, while bubo produces hard stools, which at times cannot go past the obstruction and must be removed with the finger. Unsuspecting leeches administered drugs to stop the dysentery, but Arderne gave medicines in which experience had given him confidence. He used a simple enema of bran water or mallows, without oil, butter or other fats, since fatty substances, he thought, nourish the cancer and feed it. The symptoms of those who have bubo in the lure are not unusual at first, for they are like normal persons. Toward the end, they lose their appetite and eat less meat, which does not, however, absent them from the toilet. They often die in the autumn and, near the end, run a low-grade fever, having lost their appetite to such an extent that they crave only ale or wine. Finally, day by day, they grow more feeble until they become bedridden and take little water. Death is then at the gates; nevertheless, they may speak, lift themselves up and move about to the very end. Simple clysters relieve such a patient greatly. Care should be taken in these cases to use palliation, and friends should be warned of the incurability of the disease. Such prognostication will result in more respect for the leech's profession; therefore, one should avoid misdiagnosis and abstain from false treatments. Again Arderne stresses the importance of rectal examination for a patient with dysentery. In the normal person one feels nothing, but in one who has a bubo, he reiterates, there will be felt an enlarged, solid mass like "the egg of a hen or goose." Summarizing the differential diagnostic features of the two conditions, the surgeon adds that the pain of dysentery is in the navel or flanks, whereas that of the bubo is an aching, sharp, stirring pain with tenesmus and a desire to defecate. In conclusion, Arderne points out that the patients in such cases are to be treated advisedly, so that blame will not be brought upon the leech, for, he adds, he has never seen nor heard of any man cured of bubo, though he has known many who died of it.

Fig. 4.—Some of the instruments used by Arderne for cure of fistula *in ano*: (1) the probe (*sequere me*); (2) the snouted needle (*acus rostrata*); (3) the dilator (*tendiculum*); (4) a ligature (*fraenum Caesaris*); (5) the peg (*vertile*); (6) the syringe in general use with lateral opening; (6a) Arderne's modification of the syringe with a terminal opening only (Power[21]).

It is amazing to observe the amount of knowledge possessed by this Englishman of six hundred years ago; some physicians do not appear to possess it even today.

After his discussion of cancer of the rectum, Master Arderne presents his treatment of pruritus ani and fistulas of the limbs. Notes are made on the cure of fistulas of the fingers, legs and joints — all apparently personal observations that owe nothing to tradition. In treating an inflamed sore of the leg (mormale) he advised bandaging, the use of hot and cold compresses and, later, mercurial ointment. Should dead flesh appear, he suggests that debridement be undertaken ("it is profitable to cut the dead flesh and put it away if the patient consent").

The manuscript continues with an essay on hemorrhoids. Here, for the first time, Arderne appears as a compiler, conscientiously avowing his indebtedness to the older masters of his craft, the men whose doctrines he accepted and upheld. This discussion is somewhat obscured by the nebulous theories of his predecessors in contrast to his own practical and original writings. His treatment, on the whole, is fairly sound, although he was unable to shake off some of the ancient superstitions shared alike by the wise and the foolish; for example, operations about the anus could be performed only at certain times of the year; hemorrhoids and menstruation were believed to be provoked by phlebotomy of the internal saphenous vein, while blood-letting from the external saphenous vein had a directly opposite effect. But these and other beliefs were inevitable in an age when the physiologic and astronomic dicta of the ancients were accepted as Holy Writ, unassailable by human reason and beyond appeal. It appears that other features which today we should call the nonoperative treatment of hemorrhoids differ but little from those recommended by Arderne. Styptics and soothing ointments were applied to the hemorrhoid, the cautery was used to stop the bleeding, and soothing compresses were used for inflammation, while thrombosed piles were incised and evacuated. The latter treatment, he advised, should be kept secret lest the barbers learn of this simple cure, to the detriment of the Master Surgeons. Clysters, too, were used as soon as the improved hemorrhoidal condition permitted.

In a treatise on clysters, the author finds himself once more on the safe foundation of extensive experience. He relates the details of preparing an enema and advises the use of a simple solution, the simpler the better. Into a swine bladder he would place a teaspoonful of salt, sufficient water and occasionally an equal amount of honey. Clysters, Arderne insists, require skill and should not be given by the negligent and foolish laity, for the proper administration of one he regarded as a work of perfect mystery, for which he himself had received great honor many times. The use of clysters for the diagnosis of worms is as valuable in the diagnosis of worms as is blood or pus in the stool. The administration of an enema is advised for colic and "yliac passions" [appendicitis?] and may even be given seasonally to prevent illness. The manner by which the enema relieves the patient's distress is explained by the fact that the lower part of the bowel is cleared of its superfluous contents, thus permitting the upper part to empty its contents into the now vacant lower bowel. John Arderne shows his understanding of the true value of this method of treatment when he suggests the use of a nutrient enema when a patient has no appetite.

The final section of this manuscript of Arderne's is devoted to drug preparations used in surgery. It is particularly interesting because it is full of the superstitions of Arderne's period. In spite of the confusing array of pharmaceuticals, the sur-

Fig. 5.—A portion of the Latin Stockholm manuscript of Arderne (Power[18]).

geon attempted to use them with judgment. With his characteristic honesty, he confessed his mistakes. Particular reference can be made to a youthful experience in which he almost killed two patients while attempting to use arsenic as a local application. As it happened, the patients survived, although necrosis of the tibia developed subsequently in each. Sequestrectomies resulted in their ultimate recovery, but as a result of this experience Arderne stressed the great care with which arsenic should be used.

From this section of his writings, we learn that John Arderne opposed "meddlesome surgery." He advised against caustics, preferred bland, soothing concoctions, would dress wounds daily or every third day, and even remarked upon the value of sleep to the sick man. Of course, the prep-

arations of his time reflected the mysticism with which the use of drugs was surrounded. One preparation, called "sanguis veneris" and composed of aloes, myrrh, blood and other drugs was used for application to ulcers and to wounds. The valued ingredient, blood, had to be that "of a maiden virgin or of a maiden damosel about 19 or 20 years who was never impregnated though she be corrupt," for, adds our observant and diplomatic author, "virgins cometh now full seldom to twenty years."

One of the most fascinating sections of this manuscript deals not with the technical aspect of surgery, but with advice to a leech on manners. To be a good surgeon, Arderne remarks, one must first set God before him in his work, and always call meekly upon Him with heart and mouth for His assistance. This concept precedes by two centuries the statement of Paré: "I dressed his wound, God cured him." Modesty and charity in the treating of poor patients must be among the leech's attributes. He should answer cautiously and let "work overcome thy word, for boasting lesseneth thy reputation." He should not often be seen laughing greatly or playing, and he could be careful, too, of the company he kept. He should always be occupied in things of his craft—either reading, studying, writing or praying, for exercise with books is desirable in a leech. Above all, it is profitable to remain sober, for sayeth a wise man, "Drunkenness breaketh what-so-ever wisdom toucheth." Do not be gluttonous in strange places, he continues, and avoid scorning other leeches. If another physician's name be a topic of discussion, one should neither belittle nor praise him, but should remark courteously, "I have not any knowledge of him, but I have learned not nor I have not heard of him but good and honest." In this way more will be thought of both, for, says he, "Honor is on the one who honors and not on the honored." The Master Surgeon advises the avoidance of familiarity with patients, but adds that one should be friendly with all, including the servants. Remain chaste, says Arderne, and in addressing people be neither too rough nor too familiar, for, as the wise men say, "overmuch familiarity breedeth despising." The surgeon should not be too ready to undertake a case and should always see the patient before giving advice.

Before undertaking the operation, it is important to have a clear understanding with the patient as regards the fee. For the cure of *fistula in ano*, Arderne asked the equivalent of $500 per operation, but he adds, "Nevertheless, do another physician as he thinks better and more speedfully." Should the patient ask how much time is required for a cure, the leech should reply double the time he expects. If all goes well and the patient cures himself in half the time and then asks why, the leech should answer that it was he, the patient, who was strong-hearted and suffered sharp things well and that he was of good complexion and had able flesh to heal, and in like manner feign other causes pleasurable to the patient, for patients are proud and delighted with such words. The Master continues with his opinion of the dress of the leech. It should be "soberly," like that of a "clerke," for it is apparent that any man so clad occupies gentlemen's quarters. The leech should be clean of all blackness and filth and have clean hands and well shapen nails. He is advised to hear many things but to speak little, for "it beseemth more to use the eyes than the tongue." He is warned to beware that he be not foul-mouthed or lying, for if the words be found true, few or none shall doubt the deeds. Instead, the leech should have a store of comfortable sayings and a stock of merry tales to comfort his patients. He is admonished to recognize the effect of mind on body, for it is truly said

that "one may never be in rest of body that is out of rest of soul." Finally, Master Arderne advises the leech to keep his own counsel about his patients, "for if a man see thee keep well another man's counsel he will trust better in thee."

After this brief summary of Power's translation of Arderne's *Treatises of Fistula in Ano, Hemorrhoids and Clysters*, let us consider the latest translation of the Latin Stockholm manuscript, *The Practice of Master John Arderne of Newark in the Art of Medicine and Surgery, 1412*. It is interesting that Arderne's works should have achieved such wide acclaim in his period. This manuscript was probably sent to a grandniece of John of Gaunt, who had married the King of united Norway and Sweden in 1406 and gone to live in Stockholm. The scroll is made of twelve skins of vellum about five yards in length and over a foot in width. A typical section of this scroll (Fig. 5) contains two columns of Latin script, with bordering pictures representing the diseases under consideration. A portion of the manuscript depicts cases of epilepsy, early leprosy, deafness and acne. In the center column of this selection one sees also the probing of a *fistula in ano*, as well as a sagittal section of the human body and syringes for irrigations and enemas. In the final column is shown a gouty hand, a patient with spasm (i.e., cramps), one with bleeding hemorrhoids and one patient with inflamed ones. Other phases of disease discussed in the manuscript include wounds, "yliac passions," rectal prolapse, intestinal parasites, gonorrhea and urethral stones. Therapy is even recommended for the cough of a cold, and simple remedies are offered for hiccough. The termination of the manuscript concerns the care of obstetric patients.

It appears from this manner of presentation that there existed no method or organization in Arderne's writing. He issued his writings in the form of treatises, which were collected after death, recopied, and translated at various times during the fifteenth century. These treatises actually constitute a "system of surgery" which, compiled, forms one of the epoch-making books in British surgery. The material herein described forms a large section of the system, but there are also divisions on hemorrhage (describing the manner in which patients should be bled

Fig. 6.—Engraved title page of the first edition of *Religio Medici*, 1642 (Keynes[6]).

and how bleeding can be stopped), diseases of the eyes, diseases of the male generative organs and the kidney, and diseases of women. There exists a supplementary section in which is described a series of interesting cases of Arderne's own. In his manuscripts are depicted many interesting features of the times, and in the illustrations accompanying them are preserved some of the famous crests of noble English families of the period. As a contemporary author he gives the sole explanation of how Edward the Black Prince obtained the ostrich feathers that have since become incorporated in the crest of the mail heir to the English throne.

Arderne's real fame lies in his contribution to the art and science of surgery. He established in his writings rules of etiquette for the surgeon of his day and the centuries to follow. In his treatise entitled "Of the Manner of the Leech" he attempted to elevate the position of surgery as it was then known, by teaching the neophyte surgeon honesty, frankness, humility, kindness, poise, professional courtesy and confidence, and a wholesome appearance supported by worldly wisdom. This wisdom was to be based upon knowledge, which in turn was based upon experience. Quoting little, yet maintaining a familiarity with the medical works of his time, he was singular in an age when most medical writers were nothing more than copyists. Of his surgical writings it has been said, "His descriptions are clear and concise; his remarks practical and full of common sense; in short, he anticipates in a startling manner those qualities which have been known in later times as characteristic of the English School of Surgery."

One is unable to omit some mention of the conflict between physician and surgeon which was waged so bitterly during his century and of which vestigial remnants exist to this day. As the finest surgeons of our day recognize the importance of being internists before becoming surgeons, John Arderne considered himself a "chirugus inter medicos," thus resolving, at least in his own life, the conflict so prevalent during his period.

Outstanding innovations of Master John Arderne were the illustrations of pathologic conditions and of the instruments he used. For the first time in English surgery there was an endeavor to convey to the reader a visual image of living pathologic change. The pedagogic principle that more is learned and retained through the visual sense than through any other is in great favor today and serves as the foundation for modern medical education. Furthermore, a compilation of series of cases with a statement of results, the very basis upon which current journals are published, can be traced back to Arderne's manuscripts. Modern writers identify patients by giving their initials, but Arderne identified them by the use of their armorial bearings. And so, six centuries ago, we see being laid the foundations of modern surgical ethics, teaching, practice and literature.

It is interesting to note that in 1928 Brown called attention to the fact that the title page of *Religio Medici*, the famous book written by Sir Thomas Browne in 1642, contains an illustration closely resembling one found in Arderne's works. According to Brown, "the first illustration of opisthotonus in medical literature" is in Arderne's manuscript (second figure, of right-hand column, Figure 5). The engraved title page of the first edition of *Religio Medici* (Fig. 6) represents a falling figure, from the mouth of which come the words "a coelo salus" (from Heaven, deliverance), while from the clouds appears a heavenly hand. Although the legs are undraped and transposed, the characteristic dorsiflexion of the head and the facial expression are similar to those in

Arderne's illustration (Fig. 7). Brown, referring back to Power's translation of Arderne's work, noted that the figure represented a patient with an interesting history of spasms or cramps. It seems that Arderne had obtained a remedy from a knight who swore he had seen a cure achieved within a few hours by placing a charm, written on parchment, about the patient's neck while those standing by said prayers. Brown concludes, "Here is the element of heavenly intercession for the saving of the figure. The addition of the rock, the sea and the heavenly hand readily suggest themselves." Thus it becomes apparent that John Arderne may have been responsible for the inspiration that produced the title page of Sir Thomas' book, which Sir William Osler recognized as the most famous book in medical literature.

The technical value of the medical and surgical knowledge produced by Arderne can be judged by the extracts from his works already presented. Short, accurate and concise descriptions of such things as tetanus, carcinoma of the male breast, gonorrhea and its treatment by irrigations, and excision of urethral stones make interesting reading and no doubt contributed to early recognition and understanding of these surgical diseases. The lesson the Master Surgeon learned centuries ago, not to confuse dysentery and other rectal diseases with "bubo in the lure" is today incorporated in the axiomatic teachings of the proctologist. The earliest understanding of surgical treatment of *fistula in ano* we owe to John Arderne. It is unfortunate that through the past centuries the English surgeons did not adhere to Arderne's principles of healing without suppuration, avoidance of irritating applications and infrequent dressings of the wound to permit healing. Of course, since he was a product of his environment, part of his medical treatment was confused by spells,

Fig. 7.—A comparison of the "falling figures" of Arderne and Browne (Brown[5]).

herbs and nasty or innocuous substances. Three of the preparations he concocted appeared in the first British Pharmacopoeia in 1618, and some of them were still in use in the eighteenth century. Unfortunately, his erroneous pharmaceutical knowledge overshadowed for centuries his outstanding surgical contributions.

From the evidence presented here, one can understand why John Arderne has been called the Father of English Surgery. Some seven centuries after the establishment of England, when the history of medicine and surgery in the British Isles could be viewed with greater perspective, the importance of Arderne was gaining recognition. William Black, in 1782, wrote a book that bore the pretentious title *An Historical Sketch of Medicine and Surgery from their Origins to the Present Time and of the Principal Authors, Discoveries, Improvements, Imperfections, and Errors.* There appeared in this book a chronologic chart of medical and surgical authors. The first English surgeon listed was John Arderne, who appeared in the fourteenth century with Guy de Chauliac, the father of French surgery, as his sole contemporary. William Anderson, recognizing the importance of the contributions of Arderne, has said that "a dozen men of the stamp of Arderne would have changed the

whole history of English surgery." In 1897 Dr. Anderson, a Fellow of the Royal College of Surgeons, delivered a paper on this fascinating surgeon before the Medical Society of London and so skillfully evaluated the importance of Arderne that his appraisal forms an applicable conclusion to this study:

"It is difficult at the present time to adjudge John Arderne's claim upon posterity, but when we remember into what low repute the art of surgery had fallen in his day in England, and how honestly and successfully he strove to elevate it by his example and teachings, we can scarcely do him too much honor. His art was not all we now understand as surgery . . . but he was a true clinical observer and based his treatment on experience and reason rather than on precedent and superstition. He was, moreover, almost the only English surgeon of his century who is known to have combined the actual practice of his calling with a scholastic training sufficient to master the surgical literature then available and to commit his views and results clearly to writing. It would be too much to expect that he should rise entirely above the astrological, humoral, and circulatory myths of his day, but he allowed his theories to influence him far less than his experience, and he stands as a singularly capable surgeon according to his lights and opportunities, holding his craft in due honor, and doing more than any other Englishman of his century or of the three following centuries to raise it in the world's esteem. If we compare him with his great French contemporary, Guy de Chauliac, we shall find in both the same straightness of purpose, the same solidity of reasoning, and the same harmless superstitions; but while Guy de Chauliac was a compiler of genius with a remarkable literary method and sense of completeness, Arderne was perhaps the better clinical student and the more practical surgeon; but as a writer, although he had considerable power of expression and an amusing aptitude for terse and pointed quotations, he was somewhat lacking in that gift of order which in an overstrained and often misapplied form distinguished the earlier European surgical authors. The Frenchman constructed a surgical text-book that in its way stood far above anything that had preceded it, and guided the whole of Europe for two hundred years; the Englishman left an assemblage of original observations that offered better lessons to his followers than could be drawn from any digest of the writings of his predecessors. It cannot be said that either added any striking facts or principles to the legacy of the Greeks.

"Of the man himself his book conveys a vivid picture. It is easy to see him as the leech of courtly and obliging manners, sober in attire and moderate in speech, and endowed with a self-restraint born of self-respect, with a tact that bore him well through the many difficulties that must have beset the thorny path of the chirurgeon in his day, and with a strong common sense that never rose too near to the dangerous level of genius; a good man and true, kindly and honest, but shrewd withal, with a quick eye to the main chance and a capacity for raising expediency to the dignity of principle. He was through all a surgeon, a scholar, and a gentleman, and in the records that he bequeathed he stands before us as one whom we, his professional descendants, may accept with pride and veneration as the Father of English Surgery."

GERALD N. WEISS,
M.D., F.A.C.S., F.I.C.S.
Lake Charles, Louisiana

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Advice against overeating is doubtless excellent, but it is dangerous in that it affects people who need it the least—people to whom, in fact, it may prove highly deleterious. I have in mind a family which has become imbued with the doctrine of a certain gentleman who, according to his statement, is going to live to be one hundred and fifty. The result is that their five-year-old boy is eating nothing but three spinach sandwiches a day. What sort of an adult animal will that poor child grow into? . . . When it is said that the six essentials of a diet have been determined by scientific research, this does not mean that science has constructed out of a logical abstraction a phantasm called a normal diet and then found by experimenting that it fulfils human nutritional needs. That, indeed, appears to be the manner in which modern advisers of the public construct their "normal diets," but that was not the procedure of the great physiologists who laid the foundations of our knowledge of digestion and nutrition. What they did was exactly the opposite. They observed what man's average diet was and then proceeded to ascertain why it was so essential for him.

—*Clendening*

New Books

Books Received.—The following books have been received by the Editor; they will be reviewed critically as space and facilities permit. Omission of more extended review, however, is not to be taken as criticism of the merit of the book.

J.A.M.A. Clinical Abstracts of Diagnosis and Treatment. Selected by Noah J. Fabricant. New York and London: Grune, Stratton, Inc., 1955. Pp. 627 including index.

Cardiovascular Surgery. Henry Ford Hospital International Symposium. Edited by Conrad R. Lam. Philadelphia and London: The W. B. Saunders Company, 1955. Pp. 542.

Applied Medical Bibliography for Students. By William Dosite Postell. American Lecture Series No. 259. Springfield, Ill.: Charles C Thomas, Publisher, 1955. Pp. 142.

Ophthalmology. Edited by Paul C. Craig. Fort Pierce Beach, Florida: The Froben Press, 1955. Published as a memorial to the late Dr. Otis R. Wolfe.

Peripheral Nerve Injuries. Edited by H. J. Seddon. Medical Research Council Special Report, Series No. 282. London: Her Majesty's Stationery Office, 1954. Pp. 451, with 276 illustrations.

New Concepts in Surgery of the Vascular System. By Emile Holman. Springfield, Ill.: Charles C Thomas, Publisher, 1955.

Textbook of Endocrinology. Edited by Robert H. Williams. Philadelphia: The W. B. Saunders Company, 1955. 2d ed. Pp. 776, with 173 illustrations.

The Shoulder and Environs. By James E. Bateman. St. Louis: The C. V. Mosby Company, 1955. Pp. 565, with 376 illustrations. Reviewed in this issue.

Pathology. By Peter E. Herbut. Philadelphia: Lea & Febiger, 1955. Pp. 1227, with 1,378 illustrations in 661 plates, including 6 in color.

Surgery of the Small and Large Intestine. By Charles W. Mayo. Chicago: The Year Book Publishers, Inc., 1955. Pp. 340, with 94 illustrations.

Cancer Cells. By E. V. Cowdrey. Philadelphia and London: The W. B. Saunders Company, 1955. Pp. 667. Illustrated.

Suprapubic Prostatectomy. By Theodor Hryntschak, translated into English by Noble S. R. Maluf. Pp. 187, with 14 charts, 36 illustrations of operative technic, 8 roentgenograms, and photographs of the author and his clinic. Reviewed in this issue.

The Back and Its Disk Syndromes, with Notes on the Pelvis and Coccyx. By Philip Lewin. Philadelphia: Lea & Febiger, 1955. Pp. 942, with 371 illustrations, 4 in color. Reviewed in this issue.

Bickham-Callander Surgery of the Alimentary Tract (in 3 volumes). By Richard T. Shackelford and Hammond J. Dugan. Philadelphia and London: The W. B. Saunders Company, 1955. Pp. 2,755, with 1,705 illustrations and a comprehensive index of 89 pages. Reviewed in this issue.

Fractures and Joint Injuries (Volume 2). By Reginald Watson-Jones. Baltimore: The Williams and Wilkins Company, 1955. 4th ed. Pp. 1,073, with 1,613 illustrations. Reviewed in this issue.

The Collected Papers of the Mayo Clinic and the Mayo Foundation. Philadelphia: The W. B. Saunders Company, 1955. Pp. 776, with 188 illustrations. Reviewed in this issue.

AMA Scientific Exhibits, 1955. American Medical Association. New York: Grune & Stratton, 1955. Pp. 784. Illustrated.

Sachs Essays. By Ernest Sachs. Hamden, Connecticut: The Shoe String Press, 1955. Pp. 118, with frontispiece (portrait of author).

Flight Around the World and Other Poems. By Nolie Mumey. Denver, Colorado; The Ranch Press, 1956.

BOOKS REVIEWED

Gynecology; Surgical Techniques. By Robert J. Lowrie. Springfield, Ill.: Charles C Thomas, Publisher. Pp. 523.

This is the second volume on gynecology by Lowrie and is devoted entirely to surgical technics. In its preparation 58 contributors from the United States, Canada and England participated. Practically every gynecologic operation is described and illustrated. All the contributors are leading surgeons, and they have prepared chapters on subjects in which they have a special interest. In several instances the same operative procedure is presented by two or more gynecologists because their technics differ.

In addition to purely gynecologic operations, there are contributions concerning surgical procedures in related fields, such as urology and intestinal surgery. A few operations described and illustrated are at present extremely difficult to perform and require excellent teamwork from specially trained personnel. In this category are exenteration, operations for vesicovaginal fistula or carcinoma of the cervix and the vulva, transplantation of the ureters into the bowel and plastic operations on the fallopian tubes. As time goes on, more and more young gynecologists will acquire the necessary technic for these operations, all of which are described in this book.

In spite of the large number of contributors, the text is smoothly written. The illustrations are numerous, beautiful and instructive, as they should be in a book on surgical technic. Lowrie is to be congratulated on having produced an exceptional work. The publishers also deserve great credit for having accomplished their part most satisfactorily.

J. P. GREENHILL, M.D.

Surgery of the Thyroid (Chirurgie du Corps Thyroïde). By Sylvain Blondin. Paris: Masson et Cie, 1955. Pp. 292, with 37 illustrations.

This is an excellent monograph and is representative of the surgical publications presented by Dr. Henri Mondor. Like most of the other books in this collection, the contents of this volume are of distinct value in the treatment of thyroid diseases. Dr. Sylvain Blondin gives a complete résumé of thyroid abnormalities and describes the different phases in an interesting way.

His personal experience—he discusses 667 patients he has operated on—and a thorough analysis of the present knowledge of thyroid surgery make this volume desirable to all interested in the subject.

The work is divided into a number of sections. Preoperative and postoperative care, the technic of subtotal thyroidectomy and the possible complications and their treatment are meticulously presented.

This also embraces a good classification of the various types of goiters and their pathologic pictures. The surgical treatment of exophthalmos is thoroughly described. Intrathoracic goiters, the myxedemas, cancer of the thyroid, infections and various forms of thyrotoxicoses offer interesting reading and a wealth of information.

HARRY FOURNIER, M.D.

Suprapubic Prostatectomy, with Primary Closure of the Bladder by an Original Method. By Theodor Hryntschak, translated into English by Noble S. R. Maluf. Pp. 187, with 14 charts, 36 illustrations of operative technic, 8 reproductions of pertinent roentgenograms, and photographs of the author and his clinic.

The late Dr. Hryntschak believed that all the major methods of prostatectomy should be mastered, but he noted that the individual urologist often developed one approach which he was able to apply most efficiently and efficaciously. This monograph is a description of the author's favorite technic for suprapubic prostatectomy. It is fundamentally a variation of the Harris method and is based on the principles of hemostasis of the prostatic bed and an inverting purse-string primary closure of the bladder. A chapter is devoted to a "Comparison of the Techniques of Harris and Hryntschak."

The opening chapter, "History of Transvesical Prostatectomy and Suturing of the Bladder," is an excellent review of the development of these procedures. One is astonished at the number of technical discoveries new to our era which were suggested many decades ago.

The chapters dealing with methods of examination and with the preparation of the patient for operation are routine. The chapters on operative technic, complications and postoperative treatment are the most valu-

able part of the book and worthy of careful study. Every surgical step for proper hemostasis of the prostatic cavity and primary closure of the bladder is well described and illustrated. A logical reason is given for each maneuver.

The following postoperative results are very impressive. 181 of the first 250 patients had remained in the hospital for less than fourteen days; 285 of 300 suprapubic wounds healed per priman. There were 12 fatalities in 300 successive prostatectomies; none was due to hemorrhage. It is unfortunate that the author did not live to report the five-year and ten-year results of his operations on this group of patients.

M. LEOPOLD BRODNY, M.D.

The Back and Its Disk Syndromes, Including Injuries, Diseases, Deformities and Disabilities, with Note on the Pelvis and Coccyx. By Philip Lewin. Philadelphia, Lea & Febiger, 1955. Pp. 942, with 371 illustrations, including 4 color plates.

This second edition of a book, the first edition of which was accepted and used very widely by orthopedic surgeons, represents a careful condensation of the orthopedic literature dealing with the problems of back pain and disability.

Much of the material consists of the conclusions and opinions of Lewin himself, whose experience over many years has been wide and varied. Some of the illustrations in the book are photographs or roentgenograms of Lewin's own patients, and in most instances the patients were positioned and prepared under his personal direction. This book deals with the anatomy, diagnosis and treatment of diseases and injuries to the back, including the disk syndrome.

Philip Lewin is professor emeritus and former chairman of the Department of Orthopedic Surgery, Northwestern University Medical School. He is also Professor of Orthopedic Surgery in the Cook County Graduate School of Medicine of Chicago, Senior Attending Orthopedic Surgeon at Michael Reese Hospital and Consulting Orthopedic Surgeon of the Cook County Hospital, Chicago.

The line drawings in this book are of exceptionally fine quality. These were made by Harold Laufman, a physician and surgeon, whose artistic ability is exceptionally high. This is merely one of a number of surgical texts, the value of which has been greatly enhanced by Laufman's illustrations.

This is a reference book. The biographical references in the appendix constitute the most comprehensive list this reviewer has ever seen in any orthopedic reference or text having to do with the diseases and injuries of the back. The book should be in the library of every orthopedic surgeon and every industrial surgeon, as well as others who are interested in the general problems of disease or trauma of the bones and joints.

EDWARD L. COMPERE, M.D.

Bickham-Callander Surgery of the Alimentary Tract. In 3 volumes. By Richard T. Shackelford and Hammond J. Dugan. Philadelphia and London: The W. B. Saunders Company, 1955. Pp. 2,755, with 1,705 illustrations and comprehensive index of 89 pages.

Bickham's *Operative Surgery* has been a classic for some decades. Many of us remember and retain in our libraries sets of this splendid work. The original work was completed by Dr. Warren Stone Bickham in New York in 1924. It was a monumental six-volume presentation of the technics of general and special surgery. A revision of the original work after the death of Dr. Bickham was entrusted to Dr. C. Latimer Callander of California, who engaged in the project from 1938 until his death in 1947. Those of us who knew Dr. Callander appreciate the conscientious effort he put into this undertaking. Dr. Richard T. Shackelford and Dr. Hammond J. Dugan were entrusted with completion of the present work.

With the aid of a number of competent surgeons, the work in its new form has emerged as an up-to-date authoritative presentation of present-day surgery of the alimentary tract.

The three volumes comprise thirteen chapters, each of which is handled lucidly and thoroughly. It begins with diseases of the esophagus and concludes with hernia of the gastrointestinal tract and incisions. To single out a given section would be fruitless. This reviewer comments on the entire opus as such. It is well presented and adequately and well illustrated, and can be highly recommended to all surgeons desiring to review the present status of gastrointestinal surgery. An excellent feature is that the ana-

tomic aspects of the parts concerned are thoroughly described and depicted and, where indicated, the embryologic and histologic, as well as the physiologic aspects are described. General surgical considerations, as well as exposure of the organs concerned and the various technics, are brought into sharp focus.

It is a magnificent work and does honor to the memory of both Bickham and Callander, as well as to Dr. Shackelford and Dr. Dugan.

MAX THOREK, M.D.

The Shoulder and Environs. By James E. Bateman. St. Louis: The C. V. Mosby Company, 1955. Pp. 565, with 376 illustrations.

The author of this book is Orthopaedic Consultant of Sunnybrook Hospital, Toronto, Canada, and has had a wide experience in the diseases and injuries of the shoulder, as well as other orthopedically important regions of the human body. This is a reference book rather than a textbook. It is illustrated with roentgenograms, photographs and a large number of excellent line drawings. The print is small, but the letters and words are clearly presented and the text easy to read.

The first chapter is entitled, "Evolution and Applied Embryology of the Shoulder Region and contains many interesting illustrations, showing evolutional development through the ages. Anatomy is discussed from the standpoint of applied, variational and radiographic anatomy. Physiology is discussed, with emphasis upon function. Technics and methods used in examination of the shoulder are well presented. Differential diagnosis is fully discussed, and therapy of the various and multitudinous lesions that may occur in the shoulder joint and its environs is presented with clarity and good judgment.

EDWARD L. COMPERE, M.D.

Fractures and Joint Injuries. By Reginald Watson-Jones. Baltimore: The Williams and Wilkins Company, 1955. 4th ed., vol. 4 Pp. 1,073, with 1,613 illustrations.

At long last, the surgeons who are concerned with the problems of injuries to the spine and extremities, including fractures and dislocations, will be able to obtain the fourth edition of Volume 2 of *Fractures and Joint Injuries* by Watson-Jones. Since the first edition was published, in January 1940, as a single volume dealing with these problems in the most precise and orderly manner, Watson-Jones has been the most popular of all reference books on fractures and dislocations. The third edition was published as two volumes in 1943, and Volume 1 of the fourth edition appeared in January 1952. When one takes into consideration the tremendous amount of work that has gone into this fourth edition, Volume 2, the rewriting of entire chapters, the changing and adding of many illustrations, so that Volume 2 is now approximately as large as the earlier editions which combine the material of two volumes into one, it is not difficult to understand why it has taken more than three years to bring out the fourth edition of Volume 2. The book is well worth waiting for.

Sir Reginald Watson-Jones is known at least by name to surgeons around the world. He is Extra-Orthopaedic Surgeon to Her Majesty The Queen; Orthopaedic Surgeon to His Late Majesty King George VI; Director, Orthopaedic and Accident Service, London Hospital; Senior Surgeon, Robert Jones and Agnes Hunt Orthopaedic Hospital, Shropshire, England; and Civilian Consultant in Orthopaedic Surgery of the Royal Air Force. He has been continuously, from the time the first issue was planned, British Editor of the *Journal of Bone and Joint Surgery.*

This is, indeed, a reference book intended for the experienced orthopedic or fracture surgeon, as well as those who are still studying and learning the basic technics. The printing is clear; the diction is scholarly but easy to read and understand. No text known to this reviewer has ever been better illustrated. A few color prints add a great deal to the beauty of this book and make the artists' drawings more readily understood.

This latest edition of a monumental work will be received with the same enthusiasm as were the earlier editions by the orthopedic surgeons and surgeons of trauma, throughout the English speaking nations of the world, and by the same groups of surgeons in many other countries as well.

EDWARD L. COMPERE, M.D.

The Collected Papers of the Mayo Clinic and the Mayo Foundation. Philadelphia: The W. B. Saunders Company, 1955. Pp. 776, with 188 illustrations.

The book was edited by a number of men

in charge of the section of publications at the Mayo Clinic. Its material was selected primarily with the interests of the general practitioner and the general surgeon in mind. There is quite a bit of material, representing all of the specialties, which presents fairly adequately the work of the Mayo Clinic and Foundation. The contents are divided into twelve chapters. These are classified primarily according to the specialty concerned—radiology, dermatology, neurology, anesthesia and physical medicine.

The rest of the book is divided into physiologic sections: the alimentary tract, the genitourinary tract, the ductless glands, the blood and circulatory organs, and the thorax, head, trunk and extremities. There is also a section on miscellaneous subjects; it contains two excellent chapters, one on the use of antibiotics and another called "The Difficult Patient."

The contributors are all men who work at and with the clinic and foundation. The proceedings of the staff meetings of the Mayo Clinic are represented by some excerpts. Of the 629 papers presented, 94 are from the Proceedings of December 1953, to November 1954.

The book is excellent. In trying to describe or project the idea contained within the collected papers of the Mayo Clinic, this being their forty-sixth edition, one has the feeling that he is describing a tree after examining carefully one of its smallest branches. The book is thorough and complete. It presents many subjects that are problems to most general surgeons and to practicing physicians in general. It is highly recommended to surgeons in particular and to all doctors practicing any type of medicine.

JEROME J. MOSES, M.D.

Guilt has always its horrors and solicitudes; and, to make it yet more shameful and detestable, it is doomed often to stand in awe of those to whom nothing could give influence of weight but their power of betraying.

The mischief of flattery is, not that it persuades any man that he is what he is not, but that it suppresses the influence of honest ambition by raising an opinion that honor may be gained without the toil of merit.

Long customs are not easily broken; he that attempts to change the course of his own life very often labors in vain.

Abuse is not so dangerous when there is no vehicle of wit or delicacy, no subtle conveyance. The difference between coarse and refined abuse is as the difference between being bruised by a club and wounded by a poisoned arrow.

—*Johnson*

Abstracts from Current Literature

Association of Irradiation With Cancer of the Thyroid in Children and Adolescents. Clark, D. E., J.A.M.A. 159:1007, 1955.

Fifteen children between the ages of 4 and 15 years, with carcinoma of the thyroid, had all been treated with roentgen therapy in infancy and early childhood for benign conditions of the head, neck and thorax.

Of the 15 patients, 14 were girls. The interval between irradiation and diagnosis of the neoplasm was three to ten years, with an average of six to nine years. In 11 of the cases the total dose (in air) ranged from 200 to 275 roentgens. This observation is supported by the report of Simpson, Hempelmann and Fuller, who studied a series of 1,722 children who had been treated by irradiation. The thyroid tumors that developed in the group were all in patients who had received more than 200 roentgens. Of the entire group 604 (35 per cent) had received under 200 roentgens; in none of these had any tumor of the thyroid gland developed at the time the report was made.

During recent years carcinoma of the thyroid in children has been diagnosed with increasing frequency. In the absence of contradictory testimony this has been regarded as representing a true increase, which observation seems to correlate with the greater use of roentgen therapy for benign conditions about the head, the neck and the upper portion of the thorax.

This pointed suggestion that prior irradiation about the neck in early life may be a causative factor in the development of carcinoma of the thyroid in children and adolescents is clearly deserving of further investigation.

THOMAS WILENSKY, M.D.

Invasive Carcinoma of the Cervix in Young Women. Decker, D. G., Fricke, R. E., and Pratt, J. H., J.A.M.A. 158:1417, 1955.

The authors report that no essential difference has been noted, in the end results of treatment, between women under 35 years and women over 35 in 169 cases of invasive carcinoma of the cervix.

A relative five-year survival rate of 53.5 per cent was obtained. These figures are in agreement with those of other observers. As many others have indicated, there is a grievous delay in diagnosis owing to the physician's misinterpretation of relatively minor symptoms. This is the area in which it would seem that the greatest advance could be made. Nothing can replace an adequate pelvic examination, visualization of the cervix and proper cervical biopsy in the armamentarium of the gynecologist. Once the diagnosis has been made, there should be no hesitation to proceed with complete treatment of the lesion, because of the age of the patient and the effect of an artificial menopause brought about by operation or irradiation. From this study the authors conclude that carcinoma of the cervix in the young woman is as malignant as in the over-all age group but no more so. Early diagnosis, adequate treatment, and careful follow-up are nowhere more necessary than in dealing with the condition in young women.

EDMUND LISSACK, M.D.

Les métrorragies: Signes des phlébites pelviennes latentes (Metrorrhagia as a Sign of Latent Pelvic Phlebitis). Bret, J.; Duperrat, B., and Grenier, B.: Presse Méd. 63:181, 1950.

Latent venous thrombosis in the pelvis, especially in the utero-ovarian system, up to the present, had been recognized only in the field of degenerating fibromyomas. Hysterectomy in such cases was often complicated by extensive phlebitic phenomena, the cause of which remained a mystery.

Contrary to general opinion, the authors are convinced that latent and spontaneous thromboses of the pelvic venous plexus in the woman constituted a clinical entity. The condition manifests itself primarily as metrorrhagia and can appear at any age. It is considered necessary to recognize this syndrome, as rational treatment depends on its early diagnosis.

Detailed clinical and histopathologic studies of the condition in women in full sexual maturity, at the premenopausal phase and in

the postmenopausal years are given. The main clinical characteristic of these thromboses is metrorrhagia that does not respond to hormonal or other usual treatment, is not "functional" and recedes satisfactorily with anticoagulant therapy.

Therefore, in a case of uterine bleeding that does not improve with the accepted methods of treatment, and in which there are also varicose veins or a history of phlebitic accidents, pelvic phlebitis can be suspected and the diagnosis confirmed by endometrial biopsy. This reveals thrombotic lesions of varying degrees, some of them in the process of organization.

Early diagnosis is important because it indicates not only that hysterectomy may be avoided but that it is contraindicated. Hormonal treatment is also of no avail, and the condition responds very well to anticoagulants.

This work, well written and richly illustrated, introduces a "new" cause of uterine bleeding.

WILLIAM E. NORTH, M.D.

Surgical Treatment of Coronary Insufficiency. Briggs, J. M., and Byron, F. X., World J. Surg., Obst. & Gynec. 63:559, 1955.

The authors present a short historical summary of the problem and state that three procedures have had an acceptable amount of clinical try-out: pericardial poudrage, internal mammary implantation and arterialization of the coronary sinus. They favor the cardiopericardiopexy or pericardial poudrage of Thompson, because it is technically simple, requiring very little equipment and no specialized training. The operation utilizes all available collaterals, the pericardial-phrenic arteries, the internal mammary arteries, the inferior phrenic arteries and the adjacent mediastinal vessels. It carries the lowest mortality rate and gives results equal to those obtained with the other operations. Briggs and Byron express the opinion that candidates for the operation should be patients in whose cases medical treatment has failed and who have had uncontrollable pain and symptoms for at least one year. The heart may be moderately enlarged, but patients with heart failure are not considered. There are no age limits, but there is more risk with young patients. Operation should not be performed within three months of the occurrence of an infarct, and preferably six months should have elapsed.

The authors modify the original Thompson technic thus: They make a short anterior intercostal incision in the fourth or fifth interspace, preserving the mammary vessels, enter the pleura, which allows the lung to be collapsed and retracted away, and then incise the pericardium anterior to the phrenic nerve and along its axis. All pericardial fluid is aspirated with a soft urethral catheter, and about 4 drams of U. S. P. talc is introduced into the sac and spread well over the myocardium. If some talc spills outside the sac, it will add to the inflammatory reaction and bring new vessels from the pleura and lungs. The pericardium is tightly closed. Using Thompson's criteria for evaluating results (decrease in the amount of anginal pain; increase in exercise tolerance; improved ability to attend to daily needs, and return to former or some gainful occupation) they cite their experience with 8 patients during the past two years and conclude that in 3 the results were good and in 2 apparently good. There were 3 deaths, 1 operative, the other 2 later (six and fourteen months respectively). The operative death was due to fresh infarction on the sixth postoperative day.

WARREN A. YEMM, M.D.

Noninvasive Malignancy of the Vulva. Collins, C. G.; Kushner. J.; Lewis, C. N., and Lapointe, R., A. A. of Obst. & Gynec. 6:339, 1955.

Therapeutic procedures applied to malignant disease of the vulva have been many and diverse. Irradiation, employing radium or roentgen rays, has its advocates either as the treatment of choice or as an adjunct to operation. In irradiation centers, nevertheless, some consider operation the method of choice.

The diagnosis of noninvasive malignant tumor of the vulva is made by examination of multiple microscopic sections and by signs showing that the malignant growth is limited to the epithelium.

In all cases of suspected malignant disease of the vulva, a venereal disease survey is as imperative as is a biopsy.

Complete (radical) vulvectomy suffices for the cure of noninvasive malignant tumors of the vulva. Regional gland dissection is not necessary.

EDMUND LISSACK, M.D.

Surgical Closure of Ventricular Septal Defects. Cooley, D. A., Surg., Gynec. & Obst. 101:153, 1955.

Ventricular septal defects larger than 1.5 cm. in diameter and situated in the high membranous portion of the septum usually cause significant cardiac disability, as they remain patent throughout the cardiac cycle.

Surgical closure of interventricular defects is hazardous, and relatively few successful methods have been reported.

Dr. Cooley's preliminary report is based on experience with 2 patients in whom high septal defects were surgically improved by a method modified from previously reported technics in which mattress sutures are passed through the upper third of the ventricular septum. Both patients survived the operation at 18 months and 9 years of age respectively and showed early indications of improvement.

THOMAS WILENSKY, M.D.

New Physiologic Concepts Related to the Surgical Treatment of Duodenal Ulcer by Vagotomy and Gastroenterostomy. Oberhelman H. A., Jr., and Dragstedt, L. R., Surg., Gynec. & Obst. 101:194, 1955.

In a review of the causes of recurrent ulcer following vagotomy alone and vagotomy with gastroenterostomy the authors express the opinion that several mechanisms are responsible. Incomplete vagotomy may be responsible for the recurrence of ulcers. Complete vagotomy alone may produce gastric stasis to a degree that unduly prolongs the hormonal phase of gastric secretion. This increase in gastric secretion, due to a prolongation of the humoral mechanism of secretion after vagotomy alone, can be prevented by gastroenterostomy. When this is done, however, it is essential that the gastroenterostomy stoma be placed in the gastric antrum, close to the pylorus, so that gastric stasis may be prevented. Placing this stoma high on the fundus or away from the antrum does not effectively prevent gastric stasis, and as a result gastric hypersecretion occurs, owing to hormonal stimulation.

In analyzing their failures, the authors concluded that stasis of food in the stomach and a high-lying gastroenterostomy stoma were important factors in many cases. An additional factor was the development of pyloric stenosis as a result of the healing of ulcerative lesions. When this occurs and gastric stasis results from a stoma not adequately placed, ulcers are likely to form.

The experimental and clinical observations suggest that in the performance of gastroenterostomy and vagotomy the stoma should be placed in the antrum 4 or 5 cm. from the pylorus.

M. O. CANTOR, M.D.

A Study of 50,000 Specimens of the Human Vermiform Appendix. Collins, D. C., Surg., Gynec. & Obst. 101:437, 1955.

This is the author's twenty-third publication on the human vermiform appendix, derived from a continuing study started in 1924. Eleven leading hospitals and over 250 skilled surgeons supplied the material for the statistics quoted.

Slightly more than 57 per cent of all surgically removed appendixes were within normal limits.

A recent restudy indicated that certain lesions, notably histoplasmosis, marked hyperplasia of both Meissner's and Auerbach's plexuses and even large neurofibromas were commonly overlooked in the formative years of this study.

A review of earlier microscopic slides of the appendix indicated that at least 7.81 per cent presented the characteristic histoplasma capsulatum (Darling), most often in the "germinal centers" of the submucosal lymph nodes. This has been interpreted as pointing to an unsuspected incidence of a benign juvenile type of histoplasmosis in America.

Many interesting and unusual lesions were observed, including 4 examples of proved congenital agenesia, 2 instances of true congenital duplication and 15 patients with situs transversus viscerum abdominis.

Twelve tables of statistics provide this paper with its most interesting and instructive details. For example, 956 vermiform appendixes harbored 18 varieties of worms.

Among the 50,000 specimens there were 632 primary malignant tumors, 270 of which were perforated appendiceal mucoceles producing pseudomyxoma peritonaei. In the same category 261 carcinoid tumors were placed. Of these, 222 were localized to the appendix and 39, a surprisingly high number, were reported as metastasizing.

Primary adenocarcinomas were observed in 41 instances.

This article, with its bibliography, presents a wealth of material to the student of the human veriform appendix.

THOMAS WILENSKY, M.D.

Indications for the Surgical Treatment of Gastric Ulcer. Kelley and Larimore, Southern M. J. 48:376, 1955.

There is little difference of opinion with regard to the treatment of the perforated ulcer, the grossly obstructive ulcer, the intractable bleeding ulcer, the deeply penetrating ulcer with extragastric pocket or the ulcer whose characteristics, judged by objective tests, are those of a primary malignant tumor.

The authors discuss the uncomplicated gastric ulcer, which presents a total clinical picture suggesting a benign lesion. Competent authorities, both medical and surgical, have advocated surgical treatment of this lesion. Such advice has been given because (1) resection is considered most effective in relieving symptoms, and (2) by resection, cancer of the stomach is being prevented or cured.

The authors examine the validity of some of the major reasons advanced for surgical treatment. It is concluded that uncomplicated gastric ulcers should not be removed to prevent the development of cancer or because of a possible confusion of diagnosis. In cases of presumably benign disease, the therapeutic trial should be conducted without urgency, and any decision as to change in therapeutic approach must be made on an evaluation of the total clinical picture in the individual case. Generalizations concerning the size of the crater, the location of the ulcer, the age of the patient, the duration of healing time, etc., can serve as guides to treatment, but none of them, taken individually, can be used as an arbitrary indication for surgical intervention.

The medical treatment of gastric ulcer is admittedly unsatisfactory. Too many patients relapse and too many undergo complications that will eventually require surgical treatment. The solution is not to be found in resection of all gastric ulcers. The solution lies in discovering the initiating factor, perfecting the available means of controlling gastric acidity, and educating physicians and patients alike as to the need for following a medical disciplinary regime during remission as well as during relapse.

WILLIAM E. NORTH, M.D.

Last year, in discussing some public remarks which I made jointly with the Professor of Biology at the University of Kansas, a clergyman arose to announce that "scientists must make their discoveries harmonize with the beliefs of the American people," and neither then nor at any later time did he appear to realize the enormity of what he had uttered—how blasphemous it was, how immoral. Because, translated into his own phraseology and philosophy, what he said was that if a man discovered one of God's truths and that truth was not what the American people believed, he must announce that the truth of God which he had discovered was a lie. Yet this minister's statement was a revelation of the real and unconscious attitude of his soul.

—*Clendening*

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